

KENYA COLONY AND PROTECTORATE



Department of Agriculture Annual Report 1935

VOLUME I

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Annual Report of the Department of Agriculture, 1935

VOLUME I

Part I.—Agriculture in Kenya in 1935

WEATHER.

(For the following notes the Department is indebted to the Director of the British East African Meteorological Services.)

In the Trans Nzoia area the rainfall for the year was slightly below the average. During the period of the long rains the total falls in February, May and June were above the average; January, March and April were below. The greatest deficiency amounted to 63 per cent in March, which, following on the drought of January with practically no rain, was a serious setback. The winter rains of July and August were in defect, while a further serious shortage occurred in November.

In the Kavirondo region the sequence of seasonal rainfall was much the same as for the Trans Nzoia, but the total was slightly above the average, due to the heavy rains of February, when the rainfall for the area was nearly 152 per cent above the average.

West of the Rift the rainfall for the year was slightly above the average. As for the two previously mentioned areas excesses occurred in February, May and June; that for February being very heavy—136 per cent above the average. Defects occurred in January, March and April. The falls for the winter months, July to September, were also in defect, as was that for November.

East of the Rift (the Aberdares area) rainfall for the whole year was above the average. The shortage in January, March and April was about as severe as in the Trans Nzoia and West Rift. The winter rains showed a deficiency only in July, while for the month of September they were much in excess, being 123 per cent above the average.

The records in the Rift itself showed much the same characteristics as for the west of the Rift. The fall for the year was only slightly above the average, but the variations

during the year were very pronounced. February was 138 per cent above, March 59 per cent below; May and June, October and December were all well above the average.

In the main coffee areas of Kiambu, Thika, etc., the total for the year was well above the average, and the four months, February, June, August and November, markedly above the average. The principal shortage occurred in January, with 93 per cent below the average, March with 47 per cent below, and July with 96 per cent below.

The characteristics for the whole Colony were a pronounced shortage in January and excess in February, followed by a shortage for the main growing season, March and April, a deficiency of winter rains in July and August, and an excess in December.

A table of percentage departures from the average is shown below for each of the main agricultural areas.

PERCENTAGE DEPARTURES FROM AVERAGE IN THE
MAIN AGRICULTURAL DISTRICTS

1935

Agricultural Dis- tricts	Trans Nzoia	Kavi- rondo	West Rift	East Rift	Rift	Main Coffee Area	Coast
No. of Stations	22	19	17	13	29	20	18
	<i>Per cent</i>	<i>Per cent</i>	<i>Per cent</i>	<i>Per cent</i>	<i>Per cent</i>	<i>Per cent</i>	<i>Per cent</i>
January	-98	-87	-51	-62	-84	-93	-91
February	+24	+152	+136	+81	+138	+177	+215
March	-63	-27	-66	-51	-59	-47	+64
April	-21	-17	-13	-8	-21	-32	-30
May	+51	+31	+62	+4	+32	-2	+5
June	+46	+50	+53	+69	+92	+189	-2
July	-32	-26	-21	-31	-38	-96	-35
August	-29	-30	-34	+9	-19	+116	+93
September	+14	-11	-11	+123	+8	+5	+22
October	+8	+19	+46	-4	+29	-29	+4
November	-59	-57	-55	+30	-28	+54	-40
December	+35	+38	+86	+31	+96	+27	+31
YEAR	-1	+4	+4	+8	+4	+36	+3

GENERAL AGRICULTURAL CONDITIONS.

In conformity with the upward trend in the world economic situation the position of certain commodities showed an improvement during 1935. This was particularly the case with sisal, the c.i.f. price of which rose from £15-10-0 for No. 1 at the beginning of the year to £28-10-0 at the end. The price of

butter rose at one period during the year to over 120/- per cwt. Though it subsequently declined to 87/- at the end of the year, the market remained considerably more optimistic than during the previous year. Prices of hides, tea and oil seeds registered moderate advances during the year. On the other hand, those of maize, pyrethrum and coffee were disappointing.

AGRICULTURAL STATISTICS.

It was stated in last year's Report that the Agricultural Census is now being taken biennially instead of annually as formerly. No census was taken in 1935. The census date is February 28th; owing partly to shortage of staff, partly to dilatoriness of farmers in sending in returns, and partly to peculiar difficulties in keeping in touch with owners and managers of farms, it has never been possible to complete tabulation of the returns before July. It is now considered undesirable that the publication of this report should be delayed long enough to make possible the inclusion of the latest statistics. In consequence there is a gap of two years in the publication in this report of current statistics derived from the census.

Crop reports have been issued bi-monthly, as during the previous season, and the statistics so obtained, supplemented by Customs returns, go some way towards filling in the gap.

AGRICULTURAL EXPORTS IN 1935.

The value of agricultural produce exported from the Colony during 1935 amounted to £2,510,215. This exceeds the 1934 figure by £913,510, and is the highest since 1930. The chief items contributing to this increase were as follows:—

	£
Coffee	441,580
Sisal	111,741
Tea	104,985
Maize	80,211
Cotton	47,843
Wattle Extract	30,281
Wheat Flour	19,127
Cattle	17,652
Sesame Oil	13,466
Fodder and Offals	12,247

The chief decreases were:—

	£
Hides	25,012
Wattle Bark	7,088

The increase in coffee is due partly to a late crop in the 1934-35 season, followed by an early crop in the 1935-36 season. The increases in wheat flour, cattle, sesame oil, fodder and offals are mainly a consequence of the Italo-Ethiopian war.

QUANTITIES OF AGRICULTURAL COMMODITIES, THE PRODUCE OF KENYA
EXPORTED DURING THE YEARS 1931 TO 1935 INCLUSIVE

DETAILS	Unit of Quan- tity	1935	1934	1933	1932	1931
ANIMALS, LIVING						
Cattle	No.	3,486	344	331	239	177
Sheep and Goats	"	5,491	4,094	3,735	5,392	6,344
ANIMAL PRODUCE						
Bacon and Ham	Cwt.	989	757	691	543	85
Beeswax	"	1,184	1,807	954	1,050	1,139
Butter	"	16,287	11,330	7,514	9,242	6,322
Cheese	"	756	602	473	512	65
Ghee	"	4,532	2,927	2,309	1,689	99
Hides	"	80,684	100,651	91,733	53,506	34,844
Meat, Fresh and Preserved..	"	1,842	1,773	3,927	1,164	17
Skins—						
Sheep and Goats	No.	1,190,251	979,585	960,610	524,329	932,284
Miscellaneous	"	—	6,476	7,417	5,814	3,271
Wool	Cwt.	11,273	8,948	8,330	8,503	7,784
CROP PRODUCE						
Coco-nuts and Copra	Cwt.	153	300	6,300	1,060	3,300
Coffee	"	359,883	187,017	257,214	276,041	245,991
Fibres—						
Cotton	"	25,373	10,489	9,600	4,032	2,795
Sisal	"	642,720	480,320	397,000	307,700	319,880
Fodder and Offals	"	95,280	33,480	24,769	19,280	26,680
Grains, Pulses and Meals—						
Beans	"	30,464	17,383	13,495	17,636	12,086
Maize	"	1,198,605	439,958	1,131,549	514,917	1,859,517
Maize Meal	"	106,743	90,895	24,924	5,626	20,307
Pulse (other than Beans)..	"	3,025	3,239	5,314	5,236	7,777
Wheat	"	1,025	2,004	118	1,727	63,644
Wheat Flour	"	77,561	47,421	41,076	30,221	28,082
Miscellaneous	"	24,056	14,797	13,068	336	4,724
Oil Seeds—						
Cotton	"	24,040	5,820	2,060	3,400	—
Groundnuts	"	5,380	220	7,940	2,480	13,280
Linseed	"	—	3,360	8,260	—	580
Sesame	"	39,180	30,580	64,840	45,400	9,720
Oils—						
Coco-nut	Gallon	3,724	16,915	44,756	9,660	1,743
Essential	"	3,961	2,477	3,739	4,433	1,886
Groundnut	"	5,853	12,801	—	5,344	2,752
Sesame	"	94,486	18,068	39,845	28,125	18,794
Potatoes	Cwt.	96,675	40,445	51,192	68,130	49,723
Sugar (Raw and Crystallized)	"	86,055	73,364	82,644	16,046	21,709
Tea	"	45,108	22,115	17,462	6,252	3,158
Wattle Bark	"	223,138	258,177	216,081	236,545	192,368
Wattle Extract	"	101,888	49,734	28,759	9,809	6,073

FROM FIGURES SUPPLIED BY THE COMMISSIONER OF CUSTOMS

VALUES OF AGRICULTURAL COMMODITIES, THE PRODUCE OF KENYA
EXPORTED DURING THE YEARS 1931 TO 1935 INCLUSIVE

DETAILS	1935	1934	1933	1932	1931
	£	£	£	£	£
ANIMALS, LIVING FOR FOOD					
Cattle	18,231	579	537	476	546
Sheep and Goats	2,755	2,302	1,788	2,670	3,968
Miscellaneous	324	264	291	224	23
ANIMAL PRODUCE					
Bacon and Ham	6,369	5,022	4,638	3,498	5,252
Beeswax	4,933	7,046	3,935	4,129	4,518
Butter	59,652	41,266	27,268	40,604	35,618
Cheese	3,318	2,576	2,186	2,421	2,916
Ghee	11,638	7,951	7,118	6,684	3,810
Hides	143,538	168,550	132,103	87,067	63,354
Meat, Fresh and Preserved	7,472	5,983	9,516	5,563	1,118
Skins—					
Sheep and Goats	35,849	26,089	20,496	16,167	36,870
Wool	41,710	30,037	38,481	39,293	43,427
CROP PRODUCE					
Coco-nuts and Copra	638	25	1,165	537	1,220
Coffee	934,923	493,343	832,353	1,214,392	986,988
Fibres—					
Cotton	76,326	28,483	23,584	8,589	6,588
Sisal	423,112	311,371	249,868	186,575	232,564
Fodder and Offals	16,034	3,787	4,969	3,650	4,646
Grains, Pulses and Meals—					
Beans	9,368	6,672	4,441	5,473	3,748
Maize	184,965	104,754	212,699	117,677	419,599
Maize Meal	20,002	25,755	5,815	1,456	5,442
Pulse (other than Beans)	1,635	1,534	2,022	1,823	2,707
Wheat	479	591	50	525	15,313
Wheat Flour	49,730	30,603	25,158	18,777	20,263
Miscellaneous	5,657	3,633	3,144	109	1,349
Oil Seeds—					
Cotton	3,210	694	309	533	—
Groundnuts	3,217	90	3,215	1,260	5,957
Linseed	—	1,504	3,202	2	308
Sesame	20,917	16,162	36,761	28,535	5,347
Oils—					
Coco-nut	354	1,007	4,118	1,097	240
Essential	7,823	6,799	8,777	9,355	8,091
Groundnut	727	1,116	—	630	342
Sesame	15,201	1,735	4,099	3,877	2,699
Potatoes	21,372	9,170	10,704	15,386	13,258
Sugar (Raw and Crystallized)	52,976	57,781	66,963	17,879	24,930
Tea	217,047	112,062	76,667	29,262	16,795
Wattle Bark	44,570	51,658	46,614	78,811	67,203
Wattle Extract	58,992	28,711	20,150	7,055	6,028
Other Agricultural Produce	5,151	—	—	—	—
TOTAL .. £	2,510,215	1,596,705	1,895,204	1,962,061	2,053,045

FROM FIGURES SUPPLIED BY THE COMMISSIONER OF CUSTOMS

CROPS.

Coffee.

Owing to drought in the earlier part of the year, much of the crop was small and light. In some districts a considerable amount of stripping had to be done. Towards the end of the year satisfactory rainfall was recorded, and although this arrived too late to affect the crop on the trees it allowed the trees to recover in condition.

The final departmental forecast of yield for the 1935-36 season was 286,592 cwt., which may be compared with 234,445 cwt. as estimated at the corresponding stage in the 1934-35 season. According to the Coffee Board, total exports for the period 1st July, 1935, to 7th March, 1936, amounted to 314,000 cwt.; current internal stocks were in the region of 60,000 cwt. at the latter date, and it was believed that a further 2,000 cwt. would come through from the plantations before June 30th, making a total available export for the season of 376,000 cwt. It is understood that the apparent discrepancy between exportable supplies and the Department's crop forecast may be due largely to carry-over of stocks as at 30th June, 1935, connected with the early 1935-36 crop following on the late crop of the preceding season.

Prices on the London market remained low during the year, partly because of the adverse effect of weather conditions on the quality of the season's out-turn, and partly because of the slow market for low and medium qualities. Towards the end of the year it became evident that satisfactory prices were obtainable for fine qualities.

Monthly average prices realized at the London sales were as follows :—

SHILLINGS PER CWT.

MONTH			1935	1934	1933	1932	1931
January	..	..	80	60	73	108	79
February	..	..	84	74	67	106	82
March	..	..	73	79	62	93	78
April ..	..	..	66	70	57	75	73
May ..	..	..	54	65	56	66	65
June ..	..	..	38	52	59	58	56
July ..	..	..	36	57	57	60	55
August	..	..	37	52	55	64	52
September	..	..	38	64	57	82	57
October	..	..	47	40	55	75	74
November	..	..	52	54	62	72	80
December	..	..	47	57	58	71	93
YEAR	..	..	68	69	64	85	74

A noticeable feature of the coffee trade has been a marked increase in the proportion consigned direct to the United States and Canada. The following table, compiled through the courtesy of the Secretary of the Coffee Board from monthly returns supplied by the Customs Department, shows the extent of this movement. The figures include small quantities of unhulled and parchment coffee consigned to African and Arabian ports :—

DESTINATION	1933	1934	1935
	<i>Cwt.</i>	<i>Cwt.</i>	<i>Cwt.</i>
United Kingdom	164,709	83,603	157,478
Canada and U.S.A.	29,659	52,347	123,497
Union of South Africa	18,336	14,217	20,477
Other Countries	44,268	36,592	56,618
TOTAL EXPORTS ..	256,972	186,759	358,070

DESTINATION	1933	1934	1935
	<i>Cwt.</i>	<i>Cwt.</i>	<i>Cwt.</i>
British	222,170	129,710	234,317
Foreign	34,802	57,049	123,753

The following table, compiled from figures supplied by the Commissioner, H.M. Eastern African Dependencies, Trade and Information Office, London, shows the imports into Great Britain and Northern Ireland of coffee consigned from Kenya in the last five years, with exports from Great Britain and Northern Ireland of coffee originally consigned from Kenya, and deliveries at the preferential rate of duty for home consumption :—

YEAR	Imports into United Kingdom	Exports from United Kingdom	Deliveries for Home Consump- tion at the Pre- ferential Rate of Duty
	<i>Cwt.</i>	<i>Cwt.</i>	<i>Cwt.</i>
1935 ..	158,225	28,533	104,113
1934 ..	93,033	51,009	110,168
1933 ..	222,415	87,979	117,252
1932 ..	227,807	62,457	—
1931 ..	228,930	152,067	—

Coffee Board.

During the year the Coffee Board continued to function, and was active in the pursuit of various matters of importance to the coffee industry. Among the more important subjects dealt with were : Marketing, Finance, Freights, Imperial Preference, Coffee Services, Estate Marks, Propaganda and Publicity.

Full details of the work of the Board are published in its annual report and in its monthly bulletin, copies of which may be obtained free, and post free, from the Secretary, The Coffee Board of Kenya, P.O. Box No. 1011, Nairobi.

Maize.

The 1934-35 season closed favourably. Exports during 1935 amounted to £1,198,605 cwt. of grain valued at £184,965, and 106,743 cwt. of meal, valued at £20,002. These figures are substantially in excess of those of the previous year, when exports of grain totalled only 439,958 cwt., valued at £104,754, and 90,895 cwt. of meal valued at £25,755.

An average pay-out of Sh. 5/68 per bag f.o.r. grower's station was declared by the Kenya Farmers' Association for the 1934-35 season.

Weather conditions during 1935 were favourable for yield. The area under the crop on European farms for the 1935-36 season was estimated at 129,074 acres, as compared with 123,155 acres in the preceding season. The total production on farms was estimated at 1,150,125 bags, as compared with 969,486 bags for the 1934-35 crop. The estimated yield per acre was thus 8.9 bags, as compared with 7.9 bags in the preceding season.

Wet weather during the latter part of the season induced a considerable degree of infection with pink ear-rot, and the continuance of broken weather through the harvesting period gave rise to considerable difficulty in the drying of the grain.

The heavy Argentine crop was followed by a decline in the latter half of the year in the price on the overseas market. At the end of the year East African No. 2 was quoted in London at 16/6d. per quarter, as compared with 23/6d. in December, 1934. With the prospect of an export surplus of 650,000 bags or more, it seemed probable that the local price would fall to export parity.

At the end of the year a motion was adopted in Legislative Council appropriating a sum of £12,500 for the purpose of guaranteeing a minimum return on maize for export during

the current season of Sh. 4/50 per bag (basis K.2, f.o.r. grower's station). It was hoped that this guarantee, combined with the efforts of the Agricultural Department to organize the trade in native maize so as to facilitate its export, would avert the threatened collapse of the local market.

During the year the Board of Agriculture had under consideration a Maize Export Quota Scheme designed to further the orderly marketing of the crop and to distribute the burden of export more equitably between all sections. Consideration of the measure is still proceeding.

The position as regards weevil infestation and dryness will be seen from the following grading statistics :—

STATEMENT OF MAIZE PRESENTED DIRECT FOR GRADING AT THE COAST

YEAR	Total Received	Total Graded	Slightly Weevily	Percent- age Slightly Weevily	Total	REJECTED		Other Causes
						Wet and Musty	Weevily	
	<i>Bags</i>	<i>Bags</i>	<i>Bags</i>	<i>Per cent</i>	<i>Bags</i>	<i>Bags</i>	<i>Bags</i>	<i>Bags</i>
1935	579,447	559,792	55,906	9.7	19,655	11,204	7,473	978
1934	205,826	197,324	30,347	14.8	8,502	1,686	4,325	2,491
1933	458,775	411,974	80,457	17.5	46,801	41,719	1,195	3,887
1932	289,503	250,007	62,229	21.5	39,496	25,814	7,711	5,971
1931	1,031,704	904,662	161,218	15.6	127,042	55,005	61,003	11,034
1930	1,022,086	618,092	196,643	19.2	403,994	300,354	71,840	31,800

Wheat.

The area under wheat in the 1935-36 season was estimated at 48,054 acres, as compared with 42,682 acres in the previous season. The total production was estimated at 171,571 bags, or 3.6 bags per acre, as compared with 180,205 bags, or 4.2 bags in the previous season.

Rust damage was considerable in all districts, the yield of grain being reduced and a large proportion being of low grade.

Exports of wheat flour during 1935 amounted to 77,561 cwt., valued at £49,730. The corresponding figures for 1934 were 47,421 cwt. and £30,603.

The Sale of Wheat Ordinance was continued in operation during the year, and the appointed agency continued to act on the advice of the Wheat Advisory Board. The Ordinance operated smoothly, and there were no complaints from growers. The average prices paid to growers for the different grades of wheat were :—

				<i>Per Bag.</i>
Grade 1	...	...	...	Sh. 15/11
Grade 2	...	...	...	Sh. 14/61
Grade 3	...	...	...	Sh. 14/11
Grade 4	...	...	...	Sh. 13/61
Grade 5	...	...	...	Sh. 13/11
Grade 6	...	...	...	Sh. 12/61
Under-grade	...	...	...	Sh. 9/11

The average price charged to mills, taking into account rebates on wheat milled for coastal and outside markets, during the period 1st April, 1935, to 30th September, 1935, was Sh. 15/85 per bag.

A small amount of wheat was grown by natives in the Embu District, and arrangements were made for the purchase of this wheat by the Kenya Farmers' Association under the provisions of the Ordinance.

Tea.

The area under tea increased slightly under the International Restriction Scheme. It is estimated that at the end of 1935 the total planted area had reached 12,817 acres.

Production of prepared tea during the census year, March, 1935, to February, 1936, amounted to 6,777,154 lb., as compared with 4,478,838 lb. in the previous year.

Exports during 1935 (calendar year) amounted to 5,052,096 lb., valued at £217,047, as compared with 2,476,880 lb., valued at £112,062, in 1934. Transfers to Uganda were 307,328 lb., as against 341,040 lb. in 1934.

Imports from outside East Africa amounted to 26,992 lb., as against 19,040 lb. in 1934 (the latter figure including a small amount consigned to Uganda).

In connection with the Restriction Scheme and in regard to various other matters the Department continued to work in close co-operation with the Kenya Tea Growers' Association, from whom valuable assistance was received.

Sisal.

The price of sisal evinced a sudden upward movement during the year. Opening at about £14-10-0 per ton for No. 1, it ranged about £15 until May. From that time it rose week by week until it reached £27 in October and a high point of £28 in December. The increase in production in Kenya, which has been a feature of recent years, was continued, and exports reached the figure of 32,136 tons, valued at £423,112, during 1935, as compared with 24,016 tons, valued at £311,371, in 1934.

Sisal Industry Committee.

First appointed in April, 1934, the Sisal Industry Committee, in liaison with the similar institution in Tanganyika Territory, made considerable progress in the furtherance of projects in the interests of sisal growers. A research programme under the direction of the Principal of the Lambeg Linen Industry Research Station in Northern Ireland was started with the object of developing new uses for sisal and sisal products. A reserve fund was created with a view to the eventual establishment of a High Level Research Station in Kenya, and a small financial contribution was made towards the recurrent expenses of the Low Level Research Station at Mlingano in Tanganyika Territory, which is concerned mainly with cultural and agronomic improvement. In addition to administering the fund derived from the levy on exported sisal fibre and from the Government grant, the Committee also considered a variety of proposals relating to the general welfare of the sisal industry.

Sugar.

The production of refined sugar during the period 1st March, 1935; to 29th February, 1936, amounted to 258,453 cwt., as compared with 171,990 cwt. in the preceding year.

Exports of sugar (raw and crystallized) during the calendar year amounted to 86,055 cwt., valued at £52,976. The corresponding figures for 1934 were 73,364 cwt. and £57,781.

In July, the East African Sugar Distributors, Limited, a cartel embracing all the Kenya and Uganda mills except one in Uganda, was brought to an end. The wholesale price of sugar in Nairobi dropped almost immediately from Sh. 48 to Sh. 24 per 2-cwt. bag. The retail price fell in like proportion. The production and export statistics appear to indicate a large increase in apparent consumption, though this may be due in part to unusually large orders by merchants who feared the possibility of a subsequent increase in the wholesale price.

Wattle Bark and Extract.

The value of wattle bark and extract exported during the year increased to £103,562 from £80,369 in 1934. The proportion of extract relative to that of bark continues to increase. While exports of bark have been generally maintained during recent years, those of extract have risen from 6,073 cwt. in 1931 to 101,888 cwt. in 1935.

Pyrethrum.

Pyrethrum has not so far been separately recorded in the Customs returns, but the Pyrethrum Growers' Association estimates the exports during 1935 at 500 tons. The overseas price fell disastrously during the year, Japanese flowers being quoted as low as £35 per ton in December, as against a price in the region of £80 early in the year.

Cotton.

Further considerable progress was achieved in the planting of cotton. As noted in the last Annual Report the production in the 1934-35 season aggregated 8,774 bales of ginned cotton. Complete figures for the 1935-36 season are not yet available, but the production is expected to exceed 15,000 bales.

In Nyanza, weather conditions were favourable. New ginneries are operating at Kendu and Kibos, and the southern Lake shore area is making progress.

Marked extension has taken place in the Coast area, and the quality, though still impaired by careless handling, shows a great improvement over that of the previous season.

A start was made in the Kitui district with 1,000 acres planted at the end of 1934. Drought conditions prevailed, and the yield of cotton seed reached only 153,211 lb. In Machakos and Kitui 5,000 acres were planted at the end of 1935. Preliminary work has been accomplished in Meru, Embu and Fort Hall districts, and a ginnery at Sagana is approaching completion. Some 8,000 acres in these districts and 2,500 acres in Machakos district have been planted early in 1936.

The interest of the Empire Cotton Growing Corporation in Kenya cotton was shown by the arrival in October of Mr. S. Milligan, their chief cotton expert, to advise the Government on the best means of extending cotton production. Mr. Milligan's "Inspection Note"* is being published.

* Since published: "Inspection Note on the Kenya Cotton Crop in November and December, 1935." Price 50 cents; Government Printer, Nairobi.

ANIMALS AND ANIMAL PRODUCE.

On the whole the year was a favourable one for stock-owners. Moderate rains fell in the chief pastoral areas, and the effects of the previous year's drought were largely dissipated. The consequent increase in production of dairy produce coincided most opportunely with a substantial rise in the price of butter on the London market. Prices of hides and of wool also increased.

Butter.

During the year a new creamery, a constituent member of the Kenya Co-operative Creamery organization, commenced operations at Eldoret, thus opening up a new area. The production by creameries increased considerably during the year, as is shown in the following statistics covering the last four years :—

YEAR	SUPPLIES RECEIVED FROM FARMERS AND USED FOR MANU- FACTURING PURPOSES		PRODUCTS MANUFACTURED		
	Milk	Butterfat	Butter	Cheese	Ghee
	<i>Gallons</i>	<i>lb.</i>	<i>lb.</i>	<i>lb.</i>	<i>lb.</i>
1935-36	132,230	2,166,289	2,483,944	121,468	91,567
1934-35	131,023	1,459,877	1,668,900	127,602	98,856
1933-34	90,011	1,113,656	1,235,019	124,922	55,822
1932-33	71,995	1,243,356	1,428,471	92,938	26,404

The Butter Levy Ordinance was continued in operation during the year. The quantity of butter sold locally and the assistance provided by local sales to exports during the last three years are as follows :—

YEAR				Quantity of Butter on which Levy was Received	Subsidy on Butter Exported
				<i>lb.</i>	<i>Cts. per lb.</i>
1935	..	..	..	586,920	8.386
1934	..	..	..	662,913	15.319
1933	..	..	..	606,285	20.665

As noted in the last Annual Report, the pay-out made by the Kenya Co-operative Creameries for first-grade butterfat averaged Cents 57.05 per lb. for the year ended 30th June, 1935. This compares with Cents 66.50 for the preceding year

and Cents 73.10 for 1932-33. Subsequent to June, 1935, the price of butter in London rose sharply, and the pay-out was accordingly increased to a high point of Cents 80 in October. By December it had receded to Cents 74.

As noted in an extra paragraph, the economics of the dairy industry were reviewed during the year by the Dairy Industry Inquiry Committee, which formulated a scheme of reorganization based upon a compulsory pool for all dairy produce.

Hides and Skins.

Exports of hides and skins reached a combined value of £179,387 in 1935, as compared with £194,639 in 1934. The relative quantities were as follows :—

	1935.	1934.
Hides, cwt.	80,684	100,651
Skins, Sheep and Goat, No. ...	1,190,251	979,585

During the last two years the export returns for hides have been divided into shade-dried and sun-dried, the figures being as follows :—

	QUANTITIES		VALUES		VALUES PER CWT.	
	1935	1934	1935	1934	1935	1934
	<i>Cwt.</i>	<i>Cwt.</i>	£	£	£	£
Sun-dried . .	54,340	80,618	86,111	125,428	1.58	1.56
Shade-dried	26,344	20,033	57,427	43,122	2.18	2.15

These figures give at once a measure of the progress which has been achieved to date in the campaign for better preparation and an indication of the economic benefit which accrues.

Wool.

Exports of wool during 1935 amounted to 11,280 cwt., valued at £41,710, as compared with 8,950 cwt., valued at £30,037 in 1934.

Top prices received at the London sales were as follows :—

1st Series (242 bales Kenya wool catalogued) ...	10d.
2nd Series (300 bales Kenya wool catalogued) ...	9 $\frac{3}{4}$ d.
3rd Series (688 bales Kenya wool catalogued) ...	11 $\frac{3}{4}$ d.
4th Series (166 bales Kenya wool catalogued) ...	11 $\frac{1}{2}$ d.
5th Series (293 bales Kenya wool catalogued) ...	12 $\frac{1}{2}$ d.
6th Series (569 bales Kenya wool catalogued) ...	15 $\frac{1}{2}$ d.

OTHER AGRICULTURAL PRODUCE.

An interesting item appearing in the export returns is cashew nuts, 32 tons, valued at £1,246.

LAND AND AGRICULTURAL BANK.

Lack of fresh capital for investment curtailed the Bank's activities during 1935. Thirty-eight mortgage loans were registered and issued, aggregating £41,180, and twenty short-term loans aggregating £4,830. Twelve loans, aggregating £13,839, were repaid completely. Intending applicants had to be advised that their applications could only be placed on a waiting list for consideration when funds became available.

The payment by mortgagors of instalments due showed a further decline, due mainly to the further fall in prices of coffee and maize. The extent of the default, however, indicates clearly that the great majority of borrowers have regarded their obligations to the Land Bank seriously.

Of the loans approved during 1935, 42 per cent were for discharge of existing mortgages, 23 per cent for permanent improvements, 18 per cent for purchase of land, and the remainder for purchase of stock, machinery and implements for farming operations.

ROYAL AGRICULTURAL AND HORTICULTURAL SOCIETY
OF KENYA.

The rapid expansion of the Society's activities, particularly in connection with the East Africa Stud Book and the Milk Recording Scheme, rendered additional financial assistance necessary. This work was considered a proper object of Government assistance. The basic grant-in-aid to the Society was increased from £150 to £350, and in addition Government agreed to pay a supplementary grant on the basis of £1 for every £1 by which the aggregate of subscriptions received in 1936 exceeds the aggregate received in 1935, provided that the total of the basic grant and the supplementary grant does not exceed £500.

A successful Agricultural Show was held at Nairobi on the 4th and 5th July.

In collaboration with the Department, the Maize Seed Competition was again held during the year.

BOARD OF AGRICULTURE.

The Board of Agriculture met twice in 1935. The chief subjects considered during the year were matters connected

with the orderly marketing of maize and dairy products, while a Meat and Live Stock Inquiry Committee was appointed to investigate and report on the meat and live stock industries. A report on the maize industry of the Colony, having regard to costs of production of maize grown by European producers, was submitted by a sub-committee of the Maize Inquiry Committee to the Board of Agriculture. It was decided that a Maize Control Bill should be drawn up for consideration by Government, which would provide for the institution of an export quota system similar to that in operation in South Africa under the Mealie Control Act, with the exception that there would be no provision for the payment of any subsidy. A preliminary draft of the Bill had been prepared by the end of the year.

A Dairy Industry Control Bill having been examined by Government and referred back to the Board, a sub-committee was formed to examine its provisions. The sub-committee recommended the formation of a small special committee to inquire into the dairy industry of the Colony and to formulate a scheme for the complete control of the production and distribution of milk products. The Dairy Industry Inquiry Committee was thereupon appointed by Government under the chairmanship of the Director of Agriculture. The Committee held eighteen meetings, and presented its report with a revised draft Bill in November.

One meeting of the Animal Industry Standing Committee was held during the year. The question of the establishment of a condensed milk factory in Kenya was discussed, but it was stated that firms engaged in the manufacture of condensed milk were not interested in the project of establishing a factory in Kenya. Other matters which were deliberated upon were the freight charges on slaughter live stock and the setting up of a committee to investigate and report on the meat and live stock industries.

The Plant Industry Standing Committee, amongst other matters of general interest to the agricultural community, paid special attention to the question of soil erosion, and recommended that the bulletin prepared by the Senior Agricultural Chemist should be distributed to all farmers. This recommendation was carried out. The Committee also recommended that practical demonstrations of suitable methods of combating soil erosion should be given in the field by members of the staff of the Department of Agriculture at a number of centres. The Committee passed a resolution approving the

principle of the control of marketing of pyrethrum. All these resolutions were approved by the full Board, which also approved the principle of increasing the staff of agricultural officers and assistant agricultural officers in native reserves.

A special meeting was held in October in order to discuss the proposals for the reorganization of the Department of Agriculture and the effecting of economies in the Department. These proposals were eventually left in abeyance to await consideration by Sir Alan Pim in the course of his general financial inquiry into Government expenditure in Kenya.

The cost of the Board to Government amounted to £545. Owing to the large number of meetings of committees the sanctioned amount of £500 had to be supplemented by a special warrant of £60.

Part II.—Work of the Department of Agriculture

DIVISION OF PLANT INDUSTRY

The following report on the work of the Plant Industry Division has been prepared by Mr. H. Wolfe, Deputy Director (Plant Industry).

EUROPEAN AREAS.

The Deputy Director of Agriculture (Plant Industry), Mr. H. Wolfe, went on leave at the end of February and returned to the Colony at the end of September; during his absence his duties were undertaken by Mr. G. J. L. Burton.

EXTENSION WORK.

The work of the Division of Plant Industry in the European areas would fall short of its purpose if the investigational work carried out by the officers of the Division was not brought adequately to the attention of the farming community. To some extent this object is attained by the publication of articles in the Press and in the *East African Agricultural Journal*. However, the publication of no amount of literature would replace the benefits which are derived from the personal contacts which are made by officers in meeting farmers and planters on their farms, and at farmers' days and agricultural shows.

During the year visits were made by the Senior Coffee Officer to Kiambu, Upper Kiambu, Ruiru, Thika, Nyeri, Meru, Machakos, Teita, Donyo Sabuk, Turbo, Kipkarren and Trans Nzoia. Three meetings were attended during the course of these tours and demonstrations were given on various aspects of coffee culture.

Mr. Wilkinson, Entomologist, was stationed in the Sotik district until the 24th May, after which he left for a three weeks' tour of inspection in connection with the control of maize stalk borer in the Rift Valley Province; on the 16th June he returned to Nairobi. Mr. Notley, Entomologist, visited Uganda in October and returned in December. The object of his visit was to ascertain the position with regard to mealy bug in Uganda, including the extent to which mealy bug is parasitized in that country and the effect of climate on the incidence of the pest.

Dr. Le Pelley, Entomologist, was absent throughout the year, continuing his studies in America on his Commonwealth Fund Scholarship.

Ten planters' meetings were attended during the year by members of the Entomological Section, and lectures delivered on *Hemileia*, *Antestia*, *Lygus*, *Thrips*, *Stephanoderes*, maize stalk borer and white borer (*Anthores*), and other subjects.

The Senior Plant Pathologist continued in charge of the investigations for control of coffee diseases in the western districts; he made visits to Sotik in February, and to Sotik and Nandi in July in order to inspect work on coffee berry disease and to make observations on the incidence of the disease. After visiting Sotik in February, he went to Kisii in order to examine diseases on cotton in the Kavirondo districts. Through the courtesy of the Uganda Department of Agriculture, the Plant Pathologist was enabled in September to visit the Bugishu coffee area on the Uganda slopes of Mount Elgon and to make observations on the occurrence of coffee diseases under the conditions operative in that zone.

Owing to the absence on leave of the Senior Agricultural Chemist, the amount of field work carried out by the Chemical Section was necessarily limited. The Soil Chemist carried out a survey, in conjunction with the Provincial Agricultural Officer for the Central Province, of the northern portion of the Yatta Plateau, with special reference to the possibilities of irrigation. At the end of the year, members of the section joined an irrigation officer of the Public Works Department in making a fairly detailed irrigation survey of the alluvial flats to the south of Lake Baringo, with reference to the possibility of using the waters of the Perkerra River for purposes of irrigation.

A large number of farms were visited by the Agricultural Officers at Njoro and Kitale, while plantations in various parts of the Colony were visited by Plantation Inspectors.

Farmers' days were held at Kitale, Eldoret and Nakuru on the 19th, 20th and 22nd February, when addresses were given by the Senior Plant Breeder and Experimentalist and the Agricultural Officers of Kitale and Njoro. The results of the previous season's Maize Seed Competition, which was, as usual, run in conjunction with the Royal Agricultural and Horticultural Society of Kenya, were discussed and talks given on various mixed farming problems.

A field day was held at the Plant Breeding Station, Njoro, on 21st September, when addresses were given by the Senior Plant Breeder and staff on wheat, maize, and pyrethrum, and

on pasture problems of the Rift Valley. In addition, lectures on various farming matters were given by the Agricultural Officer, Njoro, to the Farmers' Associations at Nakuru, Ngobit, Njoro, Rongai and Solai, while the Agricultural Officer in charge of grassland improvement addressed a meeting at Thomson's Falls.

The annual Coffee Planters' Days were held in Nairobi on the 24th and 25th July. Seven papers dealing with investigational work on coffee were read by officers of the Coffee, Chemistry, Entomological and Agricultural Sections, followed by discussions with the planters present. On the afternoon of the first day planters were conducted round the Scott Agricultural Laboratories in order to see the work in progress.

A field day was held at the experimental plots of the Department of Agriculture at Kitale in October.

Nairobi Show.

A show was held at Nairobi by the Royal Agricultural and Horticultural Society of Kenya on the 4th and 5th July. Officers of the Department acted as judges in various classes, as is customary. The Department's usual comprehensive exhibit was extended this year by the inclusion of large-scale models demonstrating the effect of soil erosion on maize land, coffee land and pasture land, together with the appropriate methods of control. The Forest Department co-operated in the exhibit by completing the series with a model illustrating erosion on deforested streambanks, together with a model of uneroded well-timbered banks.

INVESTIGATIONAL WORK.

The major part of the investigational work which is carried out in Kenya is done at the Scott Agricultural Laboratories, Kabete, where are resident the Senior Coffee Officer, the Senior Plant Pathologist, the Senior Agricultural Chemist, the Soil Chemist, and the Entomologists, together with subordinate staff, and at the Plant Breeding Station, Njoro, where are resident the Senior Plant Breeder and Experimentalist, the Plant Breeder, and an Agricultural Officer. The Agricultural Officer at Njoro, as well as being in charge of the field work at Njoro under the general control of the Senior Plant Breeder and Experimentalist, also carries out the duties of district Agricultural Officer for Nakuru and the Rift Valley. In connection with these duties he has experimental plots at Rongai, representing the low-moisture low-altitude areas, and at Molo, as typifying the high-altitude country.

The Senior Plant Breeder and Experimentalist supervises generally the work of the Agricultural Officer for the Trans Nzoia, who is stationed at Kitale; this work includes maize breeding and general experimental work carried out on the Experimental Station and on neighbouring farms. A small block of plots is devoted to coffee at the recently initiated Experimental Station at Kitale; these plots are supervised by the Agricultural Officer, and are intended to provide information on cultural methods and other methods relating to coffee grown on the sandy soils of the Trans Nzoia and analogous areas. The experimental work at Kitale unfortunately is necessarily limited in scope, owing to the small amount of funds which is available and to the fact that no capital grant has been made for the equipment of a station in that district. In addition there are coffee sub-stations at Sotik under a Plant Inspector (for the conduct of experiments relating to coffee berry disease), and on Mount Elgon, in charge of a Plant Pathologist (for work on Elgon dieback and coffee berry disease).

It is intended that, where the nature of the investigations permits, accounts of work completed by specialist or agricultural officers, or which is in progress, shall be published in the *East African Agricultural Journal*. Reports of certain officers (the Senior Agricultural Chemist, Senior Plant Pathologist, the Entomologist, the Senior Plant Breeder and Experimentalist, the Senior Coffee Officer, and the Provincial Agricultural Officers) will be found printed in full in Vol. II of this report.

The report of the Agricultural Officer, Njoro, will be published in the *East African Agricultural Journal*.

Both these reports will deal with the investigational work of the year, the former chiefly at the Scott Agricultural Laboratories, the latter at Njoro, Rongai and Molo. The report of the work done at Kitale will not be published this year, as it has been decided to await the conclusion of the 1936 work, when a report covering the two years will be published.

COFFEE.

The inadequate rainfall which has been experienced at the Scott Agricultural Laboratories, Kabete, during the last few years tends to interfere with the progress of experiments, though it has enabled observations to be made on the drought resistance of certain varieties of coffee.

Bordeaux Spraying.

Possibly the outstanding results obtained during the year in investigational work on coffee at Kabete occurred in the Bordeaux spraying experiment. The very large increase in yields of the sprayed plots over the control, together with the fact that the coffee trees were in a much healthier condition, demonstrated the advantages of adopting spraying as a general routine practice. Further, the liquoring tests carried out point to the fact that Bordeaux spraying as recommended has no detrimental effects on quality, but on the contrary produces a superiority, particularly in quality and intensity of "acidity".

Cover Crops and Green Manures.

No new introductions have been made during the year, but of those already established the most successful at the Laboratories seem to be the Black Mauritius bean, the salmon marled Lima bean, field peas, Niger oil and New Zealand grass pea; most promising results are being obtained from *Lathyrus latifolius* (everlasting pea), which shows great possibilities as a green manure and cover crop, as well as a wash stop.

The hairy vetch (*Vicia villosa*) and the rice bean (*Phaseolus calcaratus*) were the most striking of the cover crops grown in the Kitale plots; both of these made luxuriant growth. Teneriffe lupins (*Lupinus termis*), field peas, *Crotalaria* sp., and the Ka-Lu-A Soya bean were all good, the last being notable for the long period for which it maintains a green cover on the soil.

Fermentation.

The series of experiments at Kabete consisting of different treatments during the pulping, fermentation, drying and curing of coffee have, generally speaking, given such a slight divergence in results that no conclusions can be drawn in regard to the relative merits of the treatments. The results, however, tend to confirm the statement that, while coffee may be ruined in preparation, the particular characteristics of the bean which constitute quality may be maintained but not improved to any extent, and that cleanliness in water, tanks and machinery is a first consideration in the preparation of coffee.

Pruning.

The multiple stem plot at Kabete has been consistently more satisfactory than the single stem plot. At completion of picking, the trees pruned on the multiple stem system were less debilitated than the corresponding single stem trees,

although the multiple stem trees bore a slightly heavier crop; further, the appearance and quality of the coffee from the former was superior to the latter. The difference, from a pecuniary aspect, was valued at Sh. 12 per cwt. on the ungraded samples and Sh. 20 per cwt. on the "A" grades.

Monthly Pruning Experiment.

Results again show the necessity of a careful study of the coffee plant in each coffee area in order that pruning may be carried out at a period which will enable a flowering to be produced coincident with either the long or the short rains, as required, thereby eliminating as far as possible intermittent flowering, which throws the tree out of its normal reproductive cycle.

Coffee Varieties.

A variety known as *Amfillo* was introduced from Abyssinia during the year. Seed of this, besides being planted at the Laboratories, has been forwarded to selected areas for trial. It is satisfactory to note that a reasonable germination has occurred, considering that on two previous occasions when seed of this variety was obtained germination was a complete failure.

Attempts were made to obtain a further supply of seed of Harar for distribution but, owing to the Italo-Abyssinian dispute, no success has been attained up to the present.

Vegetative Propagation of Coffee.

Considerable success has now been attained in grafting on to seedling stock in the nursery, but grafting in the field on mature stock is proving difficult. Work, however, on the latter is being continued, and it is hoped that success will be met as technique improves, as was the case with the work carried out on the propagation of cuttings. The earlier efforts to root cuttings produced negligible results, but the work has now reached a stage, through improved propagators and medium, where 70 per cent of the cuttings are rooting successfully.

Coffee Berry Disease and Elgon Dieback.

Principal importance has been given to varietal resistance studies and to the production, by means of vegetative propagation, of combinations of rootstocks and scions suited to local conditions and resistant to coffee berry disease. General experiments designed to discover new methods of attacking the disease through spraying, nutritional and cultural practices have been in progress.

Studies on Elgon dieback point to the likelihood that the disease is essentially non-parasitic in nature. Observations thus far indicate that shade has a beneficial effect in reducing the disease and that there are types or varieties which are highly resistant to it. Types resistant to both Elgon dieback and coffee berry disease are required for farms where both diseases exist. These are being sought.

Mealy Bug (Pseudococcus kenyae).

A taxonomic study of the common coffee mealy bug was made, and it was shown to be distinct from *P. lilacinus* and re-described as *P. kenyae*. Several consignments of predators and parasites have been imported from Uganda, Bukoba, and Honolulu. Of these only one, a predatorial *Cecidomyid* from Uganda and Bukoba, has been induced to breed in *P. kenyae* in Kenya. Experiments in cultural methods of controlling *P. kenyae* have been initiated, and a study of its relation to climate has been continued. An application to the Colonial Development Fund for funds to send an entomologist to the Far East to search for specific parasites has gone forward.

Antestia lineaticollis.

Work proceeds on the relation of *Antestia* to its climatic and biotic environment, and on methods of control. With regard to the former, the work must continue for some years before results of value can be expected. A study of hand-picking as a control measure has been completed; this method is shown to be quite uneconomic, since in practice the cost of picking an adequate percentage is almost invariably prohibitive. Towards the end of the year a new method of control, dusting with finely ground pyrethrum powder, was investigated; this method showed considerable promise. Two new indigenous host plants were found.

White Borer (Anthores leuconotus),

Considerable attention was paid to *Anthores* during the year owing to a serious outbreak on one farm. The causes of this outbreak were investigated fully, and shown to be neglect of control measures in the past. A campaign against the pest was carried out in the Makuyu-Ithanga district, and a search made for indigenous host plants.

Thrips (Diarthrothrips coffeae).

A study of the cause of thrips outbreaks in the Central Province was made, and the conclusion arrived at was that the factor involved was not drought, as had previously been maintained, but temperature. A method of forecasting outbreaks was evolved.

MAIZE.

The chief work on maize which is undertaken by the Division is done in the Trans Nzoia—the principal maize-producing area of the Colony—and in the Rift Valley, which ranks second in importance as a maize area. The Agricultural Officers at Kitale and Njoro are responsible, under the supervision of the Senior Plant Breeder and Experimentalist, for this work. Work is continued at the Scott Agricultural Laboratories on the development of the strain of early maturing maize, known as *Muratha*, for issue to the native reserves, especially in the Central Province.

Maize Breeding.

The maize breeding work at Njoro and Kitale is progressing well. Valuable characteristics have segregated out in the inbred lines, which have been bred from the open-pollinated cobs selected some five or six years ago. Apparent resistance to white blight and *Fusarium* diseases are the main achievements, and it remains to be seen how far this resistance will be maintained in the progeny from the crossed inbred lines. Another important character obtained both at Njoro and at Kitale is earliness. Some of the first crosses made at Njoro which were grown in 1935 showed great promise, yielding considerably better than the crib-selected outbred seed grown on the station. Should the double-crossed seed, which is that which would be issued to farmers, prove itself economically superior to the best outbred maize in the Colony, consideration will have to be given to the commercial production of such seed in due course, when the most suitable inbred lines have been finally selected for the purpose.

Work on the improvement of *Muratha* maize continued at the Laboratories. The progeny of five cobs, the parent plants of which had shown high resistance to white blight and *Fusarium* diseases in 1934, was grown and showed similar resistance in 1935. This maize is now the nucleus of the work, and valuable results are expected from the plant selections made. The remainder of the acreage under maize was crib-selected for freedom from disease and type, and sufficient good seed was selected to supply the Local Native Council seed farms in the Central Province with their requirements. About one hundred bags of sufficiently good quality seed was also selected and issued direct to native farmers in the Kiambu district of the Central Province.

Maize Seed Competitions.

Three seed maize competitions were again carried out this year by officers of the Division, under the auspices and with the help of the Royal Agricultural and Horticultural Society of Kenya. The competitions were well supported, there being 32 entries, which, in these days of low prices, is a clear indication of the importance of good seed in the eyes of some farmers at least. Many who do not enter the competitions are, in view of the results from them, more carefully selecting their seed than in the past. The competition maize was grown at Kitale, Rongai and Njoro, as representing the chief climatic zones of the maize belts of the settled areas. The year was a difficult one for maize, and yields in the competitions were generally low. There were, however, great differences in yield between the top and bottom of each ranking list, the top and bottom yields at Kitale being 12.07 bags per acre and 5.42 respectively; at Rongai, 5.65 and 2.94; and at Njoro, 9.03 and 4.03 bags per acre. These results speak for themselves, and are an obvious demonstration of the value of using the best seed only. After the completion of the competitions, demonstration of seed selection and of the type to use were given at well attended farmers' days held at Kitale and Nakuru.

Head Smut (Sorosporium reilianum).

Field investigations of an unusually severe outbreak of head smut in the Trans Nzoia led to the conclusion that it was due to lack of inter-seasonal rains preceding planting, which had permitted accumulation of viable spores in the soil.

Ear Rot (Fusarium moniliforme Sheld.).

Interesting results were obtained in a small germination test carried out on two cobs during maize selection at the Scott Agricultural Laboratories, which bore out the correctness of the advice given by the Department for several years on the question of seed selection. Seed from the cob with a clean white pith showed much greater vigour in germination, and was almost entirely free from signs of *Fusarium moniliforme* Sheld. on the germinator, whereas over half of the more slowly germinating seeds from the cob with a dull pitch showed purple discoloration due to the disease.

Maize Stalk Borer (Busseola fusca).

A campaign against maize stalk borer was carried out in the Rift Valley Province during May and June. An interesting point with regard to this pest and Napier grass is under

investigation: Napier grass may be either a dangerous host plant or a useful trap crop, since the adult moths oviposit upon it, but whether the insect is capable of reaching maturity on this host plant is not yet known.

Green Manuring Experiments.

An experiment at Kitale gave increases of maize which were statistically significant on plots green manured in different ways, of from 3.48 bags to 6.59 bags per acre above the yield of the control (un-green-manured) plot, which gave 11.24 bags per acre. The differences between the various treatments were not significant.

An experiment to determine the effect on the succeeding year's maize crop of turning in a green-manure crop grown between maize rows six feet apart did not give statistically significant results. Twenty-five green-manured plots, in which the green manure was dug in at the end of 1934, averaged 7.88 bags per acre, while twenty-five plots ploughed in 1935 gave 8.04 bags per acre. The corresponding control plots (not green-manured) gave 7.20 and 7.65 bags per acre respectively. The ten control plots averaged 7.42 bags per acre, which was actually less than any ten plots which had grown any particular green manure. The highest yields were from the ten plots which had grown Soya beans (8.59 bags per acre) and cow-peas (8.20 bags), though it is dubious whether much reliance can be placed on this result.

The latin square at Messrs. Barnes Bros., Hoey's Bridge, for the first year failed to give significant results, although the plots manured in 1934 gave an insignificant increase in yield of 1.32 bags per acre above that of the control plots (11.76 bags per acre). It seems possible that the green-manured plots may have lost their usual superiority owing to 1935 being a wet year; that is, that the maize growing on the "unimproved" soil did not suffer from drought in comparison to that on the green-manured land, as is customary in a drier year.

The latin square on Captain L. A. Elmer's farm at Kitale again gave inconclusive results, with a very high standard error. This experimental plot seems to have been spoilt by sheet erosion. The control plots, which gave a negligible yield of 1.96 bags per acre in 1934, seemed to have benefited from the rest, and gave 10.36 bags per acre in 1935.

Green manuring does not hold out great possibilities in the drier maize-growing areas of the Colony, such as the Rift Valley. A statistical experiment at Rongai, using Madagascar

butter beans as the green manure, ploughed early and late, mulched, and as a cash crop, gave no results which were statistically significant, though the best yield (13.86 bags per acre) was given on land into which the butter beans had been ploughed early, while the control plots (maize following maize) gave only 10.94 bags per acre.

Composting, which does not involve a drain on soil moisture, is a much more hopeful method of soil improvement in these drier areas. A statistical experiment at Rongai gave an increase of 3.3 bags per acre, or 24.7 per cent over the control plots (13.3 bags per acre), for an application of 3 tons of compost per acre; 6 tons of compost gave an increase of 4.5 bags per acre, or 33.7 per cent, and $8\frac{1}{2}$ tons gave an increase of 5.6 bags, or 42.1 per cent. The application of $8\frac{1}{2}$ tons gave a statistically significant increase in yield over the yield produced by 3 tons, but it is probable that it would be more economic to dress a larger area with 3 tons of compost than to apply $8\frac{1}{2}$ tons on a smaller acreage; the determining of this point will largely depend on the residual effects derived from the different applications however.

A trial was made at Rongai of inter-planting maize with native pumpkins, with the idea of rendering all the rainfall available by preventing run-off. The pumpkins made a complete cover to the land, and certainly caused the water to percolate slowly into the ground. Unfortunately, a very dry spell at flowering caused the pumpkin plot to wilt very badly, owing to the competition between the maize and the pumpkins. It is proposed to plough in the pumpkin haulm and to test its effect as a green maure in 1936. Yields of maize were as follows: Pumpkins in maize, 4.47 bags per acre; maize alone, 5.82 bags per acre.

WHEAT.

The work on wheat is conducted chiefly at the Plant Breeding Station, Njoro. There are sub-stations, representative of the higher and lower altitudes respectively, at Molo and the Scott Agricultural Laboratories, Kabete.

A considerable proportion of the wheat harvested from the 1935 crop will be of poor quality, since the year 1935 was notable for a severe epidemic of stem rust. The reason for this was that the form most generally present throughout the country was the mostly recently discovered physiologic form, No. K.4, and the wheats in most general use, such as Kenya Governor, N.B. 230, Equator, Burbank, and B. 256.C.3. (L),

are susceptible to that form, though resistant to one or more of the others. The presence of this very virulent physiologic strain of stem rust in epidemic form also accounted for the new "Kabete" wheats and B. 256.G, which would otherwise have been useful for the lower altitudes. The variety Sabanero, imported from Peru, possesses a certain measure of stem rust resistance, and came through successfully, but is by no means a solution of the wheat problem, owing to the very poor quality of its flour.

Wheat Breeding.

The wheat breeding work continued to show satisfactory progress. Cross No. 112, of which there was sufficient seed to grow some 1,000 acres, proved extremely successful, and was very favourably commented on by those farmers to whom it had been issued. Under good conditions, yields of up to 13 bags or 43 bushels per acre were obtained, one farmer obtaining 12.3 bags to the acre off 115 acres. At the lower limits for this wheat, of about 7,000 feet, where conditions are not so favourable for high yields and for which this variety is not so suited owing to form K.2 of stem rust, the yields were somewhat lower, though in only one case was the wheat appreciably affected by stem rust. This variety is suited to the higher altitudes on account of its resistance to yellow rust. It is also resistant to the worst forms of stem rust Nos. K.1, K.3, and K.4. It possesses some susceptibility to form K.2, but, as shown this year, this form is not likely to trouble it at the higher elevations. The wheat should not be grown below about the 7,000 feet contour on account of the danger from form K.2 of stem rust. Some 5,000 bags of this wheat have now been issued, and at the higher altitudes the average yield should be approximately 10 bags per acre.

Cross No. 58, of which 100 bags have been harvested, though not suitable for the higher altitudes, owing to susceptibility to yellow rust, is showing itself as suitable for altitudes up to 7,500 feet, as Cross No. 112 is for altitudes above that contour. This wheat stood out compared with all other varieties on the farms growing it. It is highly resistant to all four of the physiologic forms of stem rust which are so far known to have occurred in the Colony, and its yielding ability is equal to that of Cross No. 112.

No large-scale milling tests have yet been done, but analyses of baking quality of a physico-chemical nature have shown that the protein quality of both Cross No. 112 and Cross No. 58, particularly the latter, are satisfactory. At the

higher altitudes the general strength of the flour from Cross No. 112 is inclined to be rather low and the stability too high, but any faults in this respect should be more than balanced by the excellent protein quality possessed by two other new varieties of wheat which have been issued to farmers, namely Nos. 117 and 112. These wheats are the results of a cross between Marquis and a locally bred hybrid. They are perhaps slightly susceptible to form K.2 of stem rust, but are highly resistant to the other three, and are proving themselves well suited to the Burnt Forest-Plateau district, where the climatic conditions are such as to minimize any slight danger from form K.2 and where the partial susceptibility of these wheats to yellow rust should not be noticeably felt.

The most notable advance has been made with Crosses 130 and 131, which are now ready for issue in small quantities. Strains from these crosses have been proved to combine high resistance to yellow rust with similar resistance to all of the four physiologic forms of stem rust. Analyses of a physico-chemical nature indicate that the protein quality of some of these strains is really excellent, in the Manitoba No. 1 class. The yielding ability of these varieties is not likely to be quite up to that of Cross No. 112.

At the Scott Laboratories work continues on the production of early maturing strains for the low-altitude, short-season districts, for which the essential requirement, besides earliness, is resistance to stem rust. The new hybrids are now in the fourth generation, and appear to be resistant to form K.4 of stem rust, to which Kenya Standard and the "Kabete" wheats were found to be susceptible on its appearance after they had been bred.

Should a new form of stem rust appear, the new wheats might or might not prove resistant. In order to minimize, as far as is humanly possible, the risk from new forms entering the country, a regulation has recently been passed by which all seed entering the Colony must be subjected to special treatment.

Take-all.

In some districts, particularly Molo-Mau Summit, the disease known as "Take-all" is assuming alarming proportions, and unless farmers take suitable steps to eradicate it, it may prove as destructive as rust. As an example of its destructive nature when attacking the crop in a late stage of its maturity, a potentially twelve-bag per acre crop of wheat No. 112 on

160 acres was reduced to an average of seven bags per acre of low quality grain. In many other cases, however, the disease attacks in the early stage in the life of the plant and reduces the crop to nothing. The remedy is to rest infected land for at least two years from wheat and to put it down to some crop which is not a carrier of the disease. Much of the investigational work undertaken by the Division at the higher altitudes is concerned with an economic solution of this problem, which is being attacked in two ways :—

(a) By laying down badly infected land to temporary leys for a minimum period of two years under grasses, or mixtures of grasses, which are not carriers of the disease. It is unfortunate that Kikuyu grass, which comes in to a large extent on arable land allowed to revert, probably is a carrier of the disease. Promising results are, however, being achieved with certain introduced grasses, which have already proved themselves under grazing conditions, and it is hoped that when satisfactory mixtures of these have been proved they will be used by farmers on an extensive scale. It is essential that the grasses which are resistant to Take-all (*Ophiobolus graminis*) shall be ascertained. Until this is done, experimental work which has as its aim the inclusion of pastures in the rotation and dairying operations in the farming scheme of the high altitude wheat areas, cannot be carried much nearer towards final practical success; not only soil fertility, but also soil sterility (the absence of this dangerous parasitic disease of wheat) must be borne in mind in providing temporary leys in these affected areas.

(b) By a suitable rotation of cash crops which are not susceptible to the disease. Such crops are linseed and marrow-fat peas, and in addition certain forage crops suitable for rotational farming are being tried.

Plant Pathological Investigations.

Considerable time was devoted by the Plant Pathological Section to various activities connected with work on stem rust of wheat. These included the artificial production of a field epidemic for the purpose of testing new hybrid selections, numerous seedling tests with the same object, and the investigation of large numbers of rust samples received from many districts to determine the form present and to discover the presence of any new form which might have appeared. One such was suspected at the close of the year.

The varieties of wheat employed as differential hosts for the detection of different forms of yellow rust were planted at stations at various altitudes up to 11,000 feet on Mount Elgon, but owing to the failure of the rust to appear, no results were obtained.

Experiments to decide what grasses can carry Take-all disease were continued, and some work on *Fusarium* root-rots was carried out. The latter indicated that these diseases are not important to wheat grown under suitable conditions.

Attempts to shorten by vernalization the period of maturation of two wheat varieties having a very long growing period were completely unsuccessful.

SISAL.

Laboratory work, carried out during the year by the Chemical Section, on the better preparation of line fibre and on the reclamation of sisal waste tow, has shown that it is possible to reduce the acidity and water-soluble content of both materials by efficient washing and drying after decortication. This is specially applicable to line fibre which has been decorticated with a small supply of water. The proper cleaning of reclaimed waste tow presents many difficulties, and an elaborate treatment is necessary to remove the major portion of the non-fibrous materials and the marked initial acidity. It has yet to be shown that these extra preparation measures, which reduce the acidity and the water-soluble content of the freshly prepared sisal, will result in higher prices.

CEREALS OTHER THAN WHEAT.

Barley and oats are grown to a limited extent in the Colony for the purpose of providing additional home-grown foodstuffs for cattle, horses and pigs. A certain area of oats is also grown in the Rift Valley for use in the manufacture of local oatmeal, which is sold in the Colony. No breeding work has been carried out by the Department of Agriculture, since it is not felt that the extent to which these crops are grown would justify the expenditure of time and money on this work. A number of importations has been made, however, and comparative trials undertaken in the mixed farming areas.

Barley.

The following five barleys were grown at Njoro: Webb's New Cross, Chevalier, Spratt's Archer, Regal, Colsess.

Chevalier was by far the best variety, and seems to be best for conditions of uncertain rainfall, owing to its short period of maturity. It gave 9 bags per acre, the next highest yielder being Webb's New Cross, which gave 3.03 bags only.

A series of Palestine and Greek barleys were again tried at Rongai, where Palestine 41 was outstanding, giving 8.1 bags per acre. Palestine 15 yielded 7 bags, and will be given further trial.

Oats.

Attempts are being continued to provide suitable varieties of oats for the country. Unsuitable conditions in the country result in a thin grain of poor quality, but practically all varieties are also very liable to destruction by stem rust. All the varieties tried succumbed to rust when grown at Njoro, but the variety Lambton did not rust at Molo, and will be given a thorough trial there next year. Issues of Biffen's hybrid oat were made on account of its suitability for hay and ensilage.

PYRETHRUM.

Pyrethrum is a crop which is increasing rapidly in importance as an export crop for the areas of the Colony at altitudes of 7,000 feet and over, the heaviest crops being produced at 9,000 feet and over. Manurial and spacing experiments are in progress at Njoro and Kitale, but no results have yet been obtained.

Pyrethrum Breeding.

Low prices for pyrethrum increase the importance of producing superior yielding types, and this work has been begun by the staff at Njoro. Pyrethrum being self-sterile in this country, the method of breeding which is being adopted is the cross fertilization of selected types and subsequent vegetative propagation. It is too early yet to expect results, but the variability in types observed has led to a recommendation to farmers to institute breeding plots consisting of mass selected superior single plants. This method is also being adopted in a critical way at Njoro, and superior plants increased by division.

Pyrethrum Survey.

The pyrethrum survey, made by members of the Chemical Section, did not show any marked differences in the pyrethrum content of flowers grown at various altitudes. The method of

analysis used gave great trouble, and eventually, at the end of the year, after several trials, another method had to be adopted.

Pyrethrum Drying.

A study was made of the various types of driers in the Colony. The demand for new types of driers is chiefly in the direction of greater cheapness; unfortunately, cheapness is often synonymous with inefficiency. Where a building has been too cheaply constructed drying is often unduly prolonged owing to cold air entering through cracks; on the other hand, the rate of drying is usually satisfactory in a well-constructed building.

Discoloration of flowers results from the use of higher temperatures (about 140°) in the attempt to accelerate the rate of drying. Adequate ventilation must be ensured, and care taken that the drier is not loaded above its normal working capacity. Whether a natural draught type of drier should be constructed or the more efficient, but initially more expensive, forced draught type will depend on the cost and availability of fuel in individual circumstances.

A full report of these investigations was published in the Press.

Funds were made available for this purpose out of a grant from the Colonial Development Fund made for the prosecution of work on essential oils and pyrethrum.

MISCELLANEOUS CASH CROPS.

A balanced farming programme requires the inclusion of a number of minor cropping enterprises which will serve to rest the land from the major crops and which, in some cases, will assist to restore the fertility to the soil. Such crops may make welcome small additions to the farm revenue when sold for export or for local sale, or they may help in feeding the stock kept on the farm.

Flaxes and Linseeds.

Irish Pedigree Flax Varieties.

Through the courtesy of the Minister of Agriculture, Government of Northern Ireland, samples of seed of new pedigree varieties of Irish flax were introduced and grown

for trial on small plots at Molo, Kitale, and Mount Elgon. The following yields of seed were obtained at Molo and Mount Elgon :—

	MOLO	MT. ELGON	
	(Seed Rate 60 lb. per Acre)	(Seed Rate 40 lb. per Acre)	(Seed Rate 60 lb. per Acre)
	<i>Lb. per Acre</i>	<i>Lb. per Acre</i>	<i>Lb. per Acre</i>
Stormont Cirrus	740	308	223
Stormont Gossamer	580	385	178
Liral Crown	540	490	290
Liral Monarch	440	583	380

Yields of from 2,080 to 2,640 lb. per acre of dry straw were obtained on the plots, sown at 40 lb. per acre, on Mount Elgon. The plots sown at 60 lb. per acre gave 1,480 to 1,600 lb. per acre.

The flax straw averaged from 36 to 37 inches in length for the Stormont strains grown at Molo and 45 to 53 inches at Mount Elgon. The Liral strains were 27 to 28 inches high at Molo and 45 to 47 inches at Mount Elgon.

Yields of seed at Kitale were recorded but are not given, since the plots suffered from wash; the straw of the various strains averaged from 37 inches to 44 inches in these latter trials.

It will be seen that the Stormont strains gave the longest straw. The Liral strains were finer in the stem at the three centres at which they were grown.

There was a considerable difference in the periods of maturity of the different varieties at Molo :—

Stormont Cirrus	...	...	182 days
Stormont Gossamer	...	...	182 days
Liral Crown	...	...	206 days
Liral Monarch	...	...	194 days

Samples of seed and straw from all three centres have been sent to Dr. W. H. Gibson, Linen Industry Research Association, The Research Institute, Lambeg, Lisburn, Ireland, for report.

There is a possibility that these pedigree strains of flax may not only be grown in certain areas for the production of seed for export—which has been sold for £75 per ton to Irish

flax-growers—but also that unretted flax fibre may be produced, as a by-product, with machinery which is now obtainable, and sold for £30 to £35 per ton. The straw itself is worth about £10 per ton.

Linseed Varieties and Diseases.

A destructive root disease of Morocco linseed at the Plant Breeding Station, Njoro, was investigated by the Senior Plant Pathologist, who found that a strain of *Rhizoctonia*, believed to be *R. solani*, was invariably isolated from infected seedlings, and cultures of this fungus proved to be very virulent in inoculation experiments. Investigations on this disease, to which the varieties Redwing and Pusa Hybrid H 21 proved resistant, are proceeding.

At Rongai the variety Morocco gave a yield of 4 bags per acre, and no disease was observed.

A trial of the Pusa linseeds, which yielded well at Njoro in 1934, was made at Molo, but they did not prove as satisfactory at this altitude as other varieties, such as Morocco.

Incidentally, the Irish pedigree flaxes mentioned above showed no sign of wilt or other disease.

Beans.

Canning Beans.

A further trials was made of the varieties grown at Njoro in 1934. Keeney's Stringless Green Refugee proved very satisfactory on account of its superiority in yield and its resistance to bacterial blight. Hodson Wax N 39 also gave very good results. A fair acreage of Keeney's Stringless Refugee is now being grown in the Njoro district, where there is a canning factory in operation, and the trials will now be discontinued.

Madagascar Butter Beans.

In the past occasional small consignments of butter beans have been rejected on the home market owing to a percentage of the beans being affected with "yellow eye", an infection of the hilums, which causes a black discoloration on cooking. Experiments have been carried out during the last two years at the Plant Breeding Station, Njoro, to ascertain if this infection was hereditary or due to outside conditions, such as climate. Results from this year's breeding experiments indicate that not only is this infection inherited but that strains have been obtained which are resistant; these strains will accordingly be multiplied.

Bacterial Blight.

Bacterial blight of beans (*Phaseolus vulgaris*) is especially prevalent at altitudes of 7,000 feet and upwards under wet conditions, and the successful growth of this crop has therefore largely been limited to warmer, drier areas below this altitude. Breeding work for resistance to this disease has, however, been begun. The varieties mainly worked with were Canadian Wonder and some of the canning varieties. Variation was observed in the field, and plants resistant to this disease were picked out and their progeny grown on separately. Most of these selected lines are now in the F₂ generation from the selection, and promise well, though at this stage it is too early to be definite about results.

Marrowfat Peas.

Spacing Experiment.

A spacing experiment, in the form of a half-drill strip, was laid down at Njoro, the same seed rate being used but the rows being spaced 16 inches and 8 inches apart. The yields obtained from the two spacings were 3.59 and 4.55 bags per acre respectively, but the difference of 0.96 bags per acre was not statistically significant.

Harvesting.

A further test was made of the harvesting method used in 1934, whereby the whole haulm was lifted when the bottom pods had begun to yellow and dried in a maize crib, being turned when necessary to prevent heating. A most satisfactory sample of excellent colour resulted. The actual figures of analysis of the peas when threshed are as follows :—

Green Peas	...	...	...	86 per cent.
Bleached Peas	...	...	...	8 per cent.
Split and Broken Peas	...	...	...	2 per cent.
Blown Peas	...	...	...	3 per cent.
Insect-damaged Peas	...	...	...	1 per cent.

Trials of two varieties of canning peas were made at Njoro and Molo, one from Milton's Preserving Company. The same technique was used for drying as in the case of the Marrowfat peas, and excellent samples resulted. The yields of these small blue peas were, however, considerably lower than those of the Marrowfats, and for this reason are probably not worth further trial.

Potatoes.

A potato cultivation experiment conducted at Njoro indicated that much more thorough cultivation than is customary in Kenya can be given to the potato crop with beneficial results.

White Sunflower.

This crop, which has already been grown successfully in the Trans Nzoia, was tried at both Rongai and Njoro, and showed considerable promise. It proved drought-resistant and yielded about 8 bags of seed to the acre at Rongai. Its period of maturity at Njoro proved to be about 5½ months.

Njahi.

Nineteen strains of Indian Bush Njahi (*Dolichos lablab*) that were reported on last year were again tested in small replicated plots of seven rows, 12 feet long and 1 foot between the rows. The seed was planted on 10th August, 1935, 6 inches apart in the rows. Harvesting the seed was carried on throughout January, 1936. The heights of the plants were not as great as those of the previous year, since they were then growing on a richer soil on the Kitale plains, while in 1935 they were planted on a Kitale sandy loam. Nevertheless, these varieties again yielded excellently.

COMPARISON OF HEIGHTS AND YIELDS PER ACRE IN
1934 AND 1935

No. of Strain	DISTRICT	HEIGHT OF PLANTS		YIELD PER ACRE	
		1934	1935	1934	1935
		<i>Inches</i>	<i>Inches</i>	<i>Bags</i>	<i>Bags</i>
1	Vizagapatam ..	18	14	3.2	5.3
2	Kistna ..	19	12	4.0	4.0
3	Cuntur ..	16	14	6.0	6.1
4	Cuntur ..	16	12	6.0	5.3
5	Chingleput ..	11	11	6.0	6.1
6	Chittoor ..	16	12	7.0	5.0
7	Chittoor ..	17	11	5.6	7.5
8	North Arcot ..	17	12	5.6	6.3
9	North Arcot ..	17	12	5.9	6.9
10	North Arcot ..	16	12	4.6	6.9
11	South Arcot ..	15	11	6.8	5.2
13	South Arcot ..	16	11	4.0	4.0
14	Trichinopoly ..	19	12	1.2	0.6
15	Trichinopoly ..	16	10	2.8	6.3
16	Madura ..	16	11	5.0	5.2
17	Madura ..	17	13	5.6	5.8
18	Tinevelley ..	17	12	4.3	3.8
10	Malabar ..	14	11	2.0	6.3
20	Coimbatore ..	14	10	4.8	5.8

It is difficult, by the figures alone, to decide on the strains which should be kept. However, when observations on the density of the foliage are taken into account, the following strains stand out : DL 3, 4, 6, 8, 9, 10, 18 and 19.

Sugar Beet.

A trial was made of this crop at all three centres, Njoro, Molo, and Rongai. It showed considerable promise at Njoro and Rongai as a fodder crop, growing well but slowly, in spite of somewhat dry conditions. Wet and cold weather at Molo discouraged it, and growth made was very poor. It is probable that it may prove useful as a forage crop for these lower altitudes, but it is doubtful whether it offers great possibilities for seed production, on account of the highly organized seed-growing trade with which it would have to compete, both in Great Britain and on the Continent.

Note.—A number of the crops or varieties mentioned above are new introductions during the year. In recent years, a great deal of varietal, experimental and other work has been carried out with introduced crops in an effort to find suitable alternative crops to grow in rotation with cereals. Many have proved suited to the natural climatic and soil conditions of the Colony, but the price factor ruled them out. However, the information collected, which has been published in previous reports, will be of value in the future. Advice based on experimental work can be given to farmers on most crops, and waste of money on unnecessary trials by farmers can be rendered avoidable.

INDIGENOUS LEGUMES FOR GREEN MANURING.

During the last few years a large number of indigenous legumes have been collected and put under trial for suitability as green manures.

It is evident that there are many hundreds of species in Kenya Colony, and in course of time it is hoped to have a record of the performance under cultivation of all those at least which appear to warrant attention.

Creeping or Procumbent Legumes.

There are many species of *Phaseolus*, *Dolichos*, *Vigna*, *Vicia*, and many other genera which offer possibilities for green manuring, but it is doubtful whether they will provide as much bulk as, for example, the Black Mauritius bean (*Stizolobium aterrimum*). It is possible to increase their number in a coffee plantation by selective weeding. Some of them are somewhat

slow in their early growth, and this would militate against their success as green manures. When fully grown many of the species have a very thick woody taproot which persists for several seasons.

Glycine javanica.

This species, which is indigenous in many parts of the Colony, is very successful at Kabete as a cover crop in coffee, and seed of this and other indigenous legumes has been issued to planters for co-operative trials.

Bush Legumes.

On the whole the indigenous types of bush green manure are more satisfactory than the procumbent types. These can be used as long-term green manures, or bush fallows, or as bush green manures and temporary shade in coffee plantations. Valuable species are a *Tephrosia* sp. from Kiambu, which is very similar to *T. vogelii*; a *Tephrosia* sp., near *Tephrosia rigida*, from Mount Elgon; and a *Tephrosia* (?) from Hoey's Bridge. Certain *Crotalaria* sp. are also useful green manures; these include *Crotalaria axilaris* and *C. kirkii*, the Nakuru *Crotalaria*. The latter grows with success in the Trans Nzoia district, and, although no large feeding trials have been made, is very palatable to cattle. *Indigofera erecta* is a valuable entrant on fallowed lands in several of the native reserves.

FORAGE CROPS.

There are no dairying areas in the Colony where supplementary feeding of cows with fodder crops is not highly desirable, if not essential, if a success is to be made of dairying. Trials which have been carried out during the last few years at the experimental plots of the Department in the main farming districts have enabled a considerable body of information to be accumulated as to the crops which are suited to the various areas.

Napier Grass and Uba Cane.

These crops have proved very drought-resistant. There is, however, a very wide difference in the rate of growth, Napier grass having yielded about three times the bulk of herbage of Uba cane during the year. Uba cane may have its place as a forage crop on account of its high sugar content and great palatability. It remained green through extremely dry periods.

Oat and Vetch Mixtures.

Mixtures of Biffen's oat and purple vetch were grown. The oats were badly droughted, and never came into ear; the

purple vetch, however, stood the drought well, and when late rains came it grew afresh and yielded a fair hay crop, although the material was somewhat woody at the bottom. It is certainly worth a further trial in a mixture. If grown alone, it would probably be very difficult to cut on account of its matted nature.

Pumpkins.

Three varieties were grown, of which Distin's, imported from South Africa, proved the quickest and heaviest yielder. On account of very high moisture content of the pumpkins, this crop would prove useful in the dry season when water for stock is often scarce.

English Midsummer Rye.

This rye proved too slow for Rongai conditions. Although it stood well, it was very droughted and never came into ear.

Ka-lu-a Soya Bean.

This made excellent growth and stood the drought well. From the plot a yield equivalent to two tons per acre of hay was obtained. It is therefore worth further trial as a hay crop in this area. Unfortunately it proved to be a very shy setter of seed and little was harvested.

Giant Rape.

This proved difficult to establish on account of sawfly damage in the early stages, but otherwise it made good growth and appeared fairly drought-resistant. It is doubtful, however, whether any farmers would be justified in planting more than a small acreage of these *Brassica* crops under Rongai conditions, on account of the difficulty of their establishment.

Hubam Clover.

This plant again proved its value as a drought-resistant fodder crop, for it yielded three cuts during the year, and in one case there was no effective rainfall between two cuts.

Lucernes.

It is somewhat doubtful whether these are likely to be of much value under Rongai conditions unless irrigated. The growth made during the year was poor, and little reliance could have been placed on them as fodder crops. Of the varieties tried, Hairy Peruvian yielded the greatest bulk during the year, but only two cuts were obtained. In view of the fact that other forage crops will yield a considerably greater bulk of herbage under dry conditions, it is probable that the lucernes are not worth further extensive trial in this area.

Teff Grass.

This grass was ready to cut for hay $2\frac{1}{2}$ months after sowing, when it had attained a height of 20 inches. No second cut was obtained, the plants dying back completely. The bulk of herbage obtained was not great, equivalent to a hay crop of about 15 cwt. per acre, and it is doubtful therefore whether the grass is likely to prove of much value as a fodder crop under Rongai conditions. Its chief use would appear to be in the fact that it will yield a crop so soon after planting, and might therefore prove of some limited use after a period of severe drought or locust infestation.

Oat and Vetch Mixtures.

Different seed rates of both oats and vetches were used in order to determine the optimum rate. Both Purple and Woolly Pod vetch were used. Purple vetch proved to be the most suitable for the mixtures, owing to the fact that it is quicker than Woolly Pod, and climbs more readily round the oats, thus rendering it easier to cut. A considerable amount of the Woolly Pod vetch was left on the ground after the mower had passed over, owing to its creeping nature.

The optimum seed rate proved to be :—

Purple vetch	...	...	30 lb. per acre.
Biffen's oat	...	...	34 lb. per acre.

This yield an extremely heavy bulk in spite of somewhat dry conditions during growth, and a hay which proved very palatable to cattle.

Silage Mixtures.

Large-scale trials were made of oat and P.B.I.P.50 pea mixtures, also oat and New Zealand grass pea mixtures, as silage crops. Biffen's oat made very heavy growth, and its tillering capacity is such that it was obvious that the New Zealand grass pea is unsuited for growing in association with it. The P.B.I.P.50 pea, which was drilled in the oats three weeks after the latter, was seeded again, proved satisfactory for a mixture, and a heavy yield of fodder was obtained. Several seed rates of this mixture were tried, the following proving most satisfactory :—

P.B.I.P. peas	...	...	80 lb. per acre.
Biffen's oat	...	...	55 lb. per acre.

A yield of approximately nine tons of silage per acre was obtained from this mixture, although conditions were rather dry during growth.

Trials were again carried out with the use of raw cane sugar molasses in the process of ensiling, and a 1 per cent solution watered on as the pit was being built proved to yield an extremely palatable mixture.

Napier Grass.

The Songhor Napier grass has proved the slightly more drought-resistant of the two varieties, but the total bulk obtained from the imported grass was found to be greater, as cuttings were made frequently.

Uba Cane.

This grew slowly at Njoro, but shows signs of being drought-resistant. It is probably more suited to the lower elevations however.

Pampas Grass.

This grass, although very difficult to establish on account of the slow growth in the initial stages, has proved extremely palatable to cattle and very drought-resistant. It may readily prove to be a useful dry season crop, and is worth extended trial.

Pumpkins.

As at Rongai, Distin's proved the quickest maturing and heaviest yielding of the three varieties tried and is likely to prove of value for the dry season.

Sainfoin.

The seed of this crop was imported from England. Unfortunately it grew very slowly indeed, although it proved fairly simple to establish. It is probably worth trial for a further year, as it might prove useful as a leguminous pasture plant.

English Midsummer Rye.

This rye has grown very slowly at Njoro, but stooled exceptionally well. It is probable that it may prove useful, on this latter account, as a crop for sheep-folding at the higher altitudes.

White Mustard.

This crop yielded very disappointing results. It was planted twice and eaten completely to the ground, in both cases by sawfly caterpillars.

Kales, Cabbages and Rape.

Trials of these have been continued to test how long they will persist. It is important to note that, in the case of the kales, at the first cutting they should be cut down to within

three or four inches of the ground, so that an abundance of leaf growth may be obtained subsequently. The usual practice in Kenya of stripping the leaves off the stem has proved to be unsatisfactory, in that the plant will make little subsequent leaf growth.

Trials of Forage Crops for Molo and Other High Altitude Districts.

Forage crops grown at Molo were : Songhor Napier grass, oat and vetch mixtures, Ribaya horse beans, white mustard, giant rape, English Midsummer rye.

The wet cold weather which prevailed at and after planting time affected all these crops rather adversely. The Songhor Napier grass grew slowly and was severely affected by frost and cold. The oat and vetch mixtures were the most promising of these fodder crops tried, purple vetch and Biffen's oats proving a very satisfactory mixture.

The *Brassica* crops (white mustard and giant rape) were completely destroyed by sawfly caterpillars, and the uncertain incidence of this infection makes their cultivation a difficult problem. Further, it has been found at Molo that in a successful year when there has been no damage by sawfly the *Brassica* crops tend to seed very freely and their eradication from the arable land is by no means easy owing to the oily nature of the seeds and the length of time over which they may remain dormant.

English Midsummer rye, although slow growing, is likely to prove of value as a possible feed for sheep folding, a practice which should be encouraged in this area.

Yields of Fodder Crops Suitable for the High Altitude and Intermediate Areas.

Six types considered suitable for feeding green and ensilage in the high altitude and intermediate areas are being compared at Kabete on the basis of yield of green and dry matter. The investigation is to be extended to the yields of nutrients by arrangement with the Chemical section. These types include several plants commonly used by natives for feeding green. The experiment is now well established and the yield cuts have been started.

No additional work was carried out during the year on forage crops for the Kitale district : a small trial of Danish mangolds gave poor results.

GRASSLAND INVESTIGATIONS.

The importance of grassland in the farming economy of the Colony, not only in the pastoral areas but in the arable farming areas, is being increasingly recognized. The work which is being carried out on grassland improvement by the Division of Plant Industry is being extended accordingly. This work is being undertaken chiefly at three centres, under the co-ordinating guidance of the Agricultural Officer in Charge, Grassland Improvement. The first is at the Veterinary Research Laboratory, at an altitude of 6,200 feet and under an average rainfall of 42 inches, where the work is under the direct supervision of the above-mentioned officer; the climatic conditions at this station are transitional between the areas of high moisture and low temperature, described in the 1934 Annual Report, and the areas of intermediate conditions.

The second is at the Plant Breeding Station, Njoro, at an altitude of 7,100 feet, with a rainfall of about 36 inches. This station only represents a relatively small climatic area and therefore sub-stations are maintained at Rongai (altitude 6,100 feet, rainfall about 35 inches) and Molo (altitude 9,000 feet, rainfall about 42 inches). The work at these places is carried out by the Agricultural Officer, Njoro.

The Agricultural Officer, Kitale, is in charge of the grass work on the experimental plots at Kitale and of grazing trials on a farm three miles away. Both these places are typical of the main Trans Nzoia farming area, at an altitude of about 6,200 feet, with a sandy loam soil and a rainfall of about 48 inches.

TRIALS OF GRASS SPECIES.

Several hundreds of trials have been made of indigenous and introduced grasses during the last few years at Kabete, Njoro and Kitale. These trials have already yielded results of great value and have succeeded in isolating the few grasses which are worthy of further investigation in each district. There remains great scope for work on the isolation of superior strains of the grasses indigenous to the various areas.

Kikuyu Grass (Pennisetum clandestinum) Strains.

Three types of this grass, distinctly different in appearance have been obtained and an experiment has been established at Kabete for the purpose of comparing them.

Rhodes Grass (*Chloris gayana*) *Strains.*

A number of clearly different strains of this grass have been obtained and a comparison of three of these is also being made at Kabete.

Drought Resistant Grasses for Comparatively Dry Areas.

The grasses which were outstandingly successful in resisting drought at Rongai were as follows :—

Indigenous *Cynodon* spp. (Star grass).

Amphilophis pertusa.

Cenchrus ciliaris (erect and creeping strains).

Melinis minutiflora (Molasses grass).

Setaria aurea (Golden Timothy).

A plot of Woolly-finger grass (*Digitaria eriantha*) was established and shows fair promise of drought resistance. Owing to its slow growth, however, it is as yet too early to say whether it is likely to prove of permanent value in this area. It would appear from the results obtained to date that there are no grasses, with the possible exception of Australian Rhodes grass, which are likely to be an improvement on the local indigenous Star grass when palatability, bulk of herbage produced and drought resistance are all taken into account.

Rhodes grass may prove to be a very useful grass in the Naivasha area also.

TRIALS OF PASTURE LEGUME SPECIES.

The plant association in a good pasture will contain leguminous plants which add valuable proteins to the feed of the animals and which assist the graminaceous part of the herbage by fixing nitrogen in the soil. Scores of trials of introduced clovers and other pasture legumes have been made in Kenya, but little success has yet been obtained, acidity of soil, or the intense evaporation to which plants are subjected, usually results in poor growth being made, though high quality seed can be obtained from introduced clovers grown in Kenya.

Species of legumes which are deserving of further trial at Kitale are subterranean clover, Dwalganup Early variety (*Trifolium subterraneum*), Persian or Shaftal clover (*T. resupinatum*), Montgomery Red clover (*T. pretense*), *Medicago lupulina* and Burr clover (*M. denticulata*). Lucerne varieties are apt to suffer from leaf diseases in wet weather, and there is scope for selection of strains in acclimatized seed which are more

suitcd to the climatic conditions of the district. It is possible that continued selection from the other leguminous pasture plants also may yield good results.

Indigenous Pasture Legumes.

Considerable attention is being paid to the possibility of obtaining indigenous leguminous pasture plants since these have, of course, particular suitability for the climate and should therefore exhibit desirable persistence in grazing mixtures.

In the high altitude areas, where Kikuyu grass pastures can be developed, *Trifolium Johnstonii* is a natural constituent of these pastures and a study of this clover has been undertaken at Kabete. This work includes (a) the effects of management and (b) the comparison of strains which have been isolated. In connection with the artificial establishment of pastures in the intermediate climatic areas of the country, many legumes have been tested with, as yet, but little success. One of the main aims recently has been to obtain a type suitable for sowing in mixture with Rhodes grass. This clover is also promising in the Rift Valley, while the local Trans Nzoia strain has made extremely good growth in plots at Kitale and has a tendency to spread into neighbouring plots.

Another indigenous grass which has given considerable promise is *Indigofera tettensis*; this leguminous plant may be particularly useful for hay production.

It is hoped that yet other valuable leguminous plants may be selected from the indigenous flora in the future.

Indigenous Clover (Trifolium Johnstonii) Strains.

Three types of this clover have been obtained locally at Kabete and the material is being increased in order to compare these types.

Leguminous Pasture Plants for Rongai.

Trials of these have yielded disappointing results, the local indigenous clover *Trifolium Johnstonii* having proved to be the most promising. Growth of *Lespedeza* and *Medicago denticulata* was very poor.

GRAZING TRIALS.

When the most suitable herbage plants for each district have been determined, the first stage only of grassland experimentation has been concluded; there remains the lengthy task of ascertaining the best methods of grassland management,

the intensity of stocking which should be adopted on natural veldt or planted pasture, the deciding as to which grasses are most palatable, nutritious, persistent under grazing conditions and drought resistant. A number of experiments have been begun by the Division of Plant Industry with some of these aims in mind, though shortage of funds renders the progress of the work necessarily somewhat slow.

Intensity of Grazing Experiments.

Natural Kikuyu grass pasture has been subjected to different degrees of severity of grazing. The treatments have now been completed and it is hoped to report the results at an early date.

In addition the grass burning and intensity of grazing experiments were continued at Ngong. These latter experiments have now been brought to an end with a view to making records of the constitution of the herbage.

Grazing Tests of Single Species and Mixtures.

Ten 1/10th acre plots of the most promising species for the area have been established at Kabete, in order to compare the behaviour of these species under grazing conditions.

The grazing trial on three acres of Rhodes grass at Ngong showed this pasture to be far superior in milk-producing capacity to natural veldt pasture with unlimited grazing.

Acre plots of the grasses which have been found most successful at Njoro have been established for comparison under grazing with reverted pasture on which the herbage is composed largely of *Cynodon* spp., Kikuyu grass, indigenous Rhodes grass, *Trifolium Johnstonii* and *Indigofera* spp. The grasses which are being tried are Australian Rhodes grass, *Paspalum dilatatum* and *Phalaris tuberosa*; the leguminous plants include lucerne and Korean Lespedeza. Broadcasting was found preferable to drilling the seed, but heavy rolling was found to be essential in order to obtain a good stand.

The large scale grazing plots on ordinary veldt at Njoro showed a continued increase in the amount of *Pennisetum schimperi* present. The improvement of pastures in this and similar districts seems to lie in the planting down of grass or in the natural reversion of arable lands rather than in the improvement of veldt by intensive grazing.

Large palatability trials of English grasses at Molo showed that the cattle preferred Italian and Perennial ryegrasses, rather than Cocksfoot and Danish Meadow Fescue. Birdsfoot

Trefoil persisted fairly well in the pastures and the English grasses kept out the indigenous Kikuyu grass to a remarkable extent. There was a considerable incursion of the indigenous *T. Johnstonii* into the pastures.

On the poorer soils at Molo, Western Wolths ryegrass, Cocksfoot and *Phalaris tuberosa* were established successfully. *Panicum maximum* and Sainfoin are both worth further trial.

At Kitale the two 1-acre paddocks of natural veldt showed little change in herbage after three years' intensive grazing. The planted paddocks continued to be far superior, though the Kikuyu grass which was planted chiefly does not present the luscious appearance which it has in the high altitudes of the Colony where evaporation is not so intense.

Five acres of ploughed virgin veldt were planted at Mr. A. Wartnaby's farm, Kitale, with fourteen different mixtures, on half- or quarter-acre plots, for permanent or temporary leys. These plots have not yet been grazed, but at present the following grasses appear to be the most successful :—

Paspalum dilatatum.

Chloris gayana (local strain).

Chloris gayana (Australian strain).

Molasses grass (*Melinis minutiflora*).

The latter two grasses make a good association in pasture.

Rejuvenation of Pastures.

The experiment was continued at Naivasha in which rejuvenation of pasture by sowing grass seed was attempted, but little success was achieved. On the other hand the natural cover of Star grass (*Cynodon plectostachyum*) showed remarkable powers of recovery when there was sufficient rain to permit it to grow.

A large-scale experiment on Mr. W. G. Sewall's farm at Njoro showed that it is difficult to obtain satisfactory results from reseeding grasses unless the land has been ploughed. The germination of seeds on land which had only been disked and harrowed was very poor. The rejuvenating effect of cultivation on the indigenous herbage was most marked, particularly with indigenous *Cynodon* spp. Australian Rhodes grass proved more satisfactory for seeding than *Paspalum dilatatum*, which did not compete satisfactorily with the indigenous volunteer grasses.

MANURIAL EXPERIMENTS.

It must be confessed that experiments dealing with the application of artificial manures to grassland in Kenya are somewhat academic at present, with present prices for fertilizers and the immature stage of development of the dairy industry in the Colony. However, a small amount of work is being undertaken on the effect of organic and inorganic fertilizers on grassland in the areas in which other experiments on grassland improvement are in progress.

An experiment intended to indicate the effects of mineral fertilizers and farmyard manure on the yield and botanical composition of natural Kikuyu grass herbage has been continued at Kabete.

Farmyard manure applied at the rate of twenty tons per acre has produced a definitely greater bulk of herbage than other treatments. The plots receiving ammonium sulphate have been distinctive each season by the darker green colour of the herbage, but no marked increase in yield has been observed. The dressings of super-rock phosphate have resulted in temporary increases in the proportion of indigenous clover (*Trifolium Johnstonii*), particularly where this manure was combined with potassium sulphate. No further results are evident from an examination of the plots, but it is clear that an investigation, primarily of a chemical nature, should be made of the degree to which the herbage is capable of absorbing the minerals applied, particularly as it is known that, in general, calcium and phosphorus are deficient and that these elements will almost certainly have to be applied in connection with any intensive grazing methods which may be adopted.

A further manurial experiment was established during the year on heavily grazed Kikuyu grass pasture with a view to investigating the possible indirect effect upon yield of phosphatic manure, by stimulation of the clover, as against the direct effect of nitrogenous manure.

Similar experiments are in progress at Naivasha and on the Athi Plains. No results have yet been obtained from an experiment on Mr. Bellhouse's farm at Molo, in which applications of lime, salt, phosphates, potash and nitrogen have been made to grassland.

Little difference can be seen on the fertilized strips in the artificially planted paddocks at Kitale. The grass where a complete dressing of nitrogen, potash and phosphate had been applied had the best "bottom" and the unfertilized strip

was distinctly poorest both as regards the amount of ground cover provided and the nature of the species present. However, it is undoubted that organic manure produces by far the greatest effect on these sandy soils, though no strip in which there is a treatment of boma manure has been included in the experiment.

Seasonal Yields of Various Grass Species.

In order to make a detailed comparison of the performance of eight grass species which have been chosen as the result of earlier work at Kabete, these species have been established in a series of properly replicated plots and are to be subjected to a uniform system of cuts.

Seed Production Plots.

With a view to building up a supply of seed of the more promising pasture plants in the work, ten 1/10th acre plots of species of proved seed-producing qualities were established at Kabete.

Work on Grassland in Native Areas.

An account of this work will be found in the portion of this report which is devoted to native agriculture.

INVESTIGATIONAL WORK ON SOILS.

Owing to the absence on leave on the Senior Agricultural Chemist, most of the time of the Soil Chemist was taken up with the rotation work and little investigational work on soils could be accomplished. Mention has already been made of the soil survey carried out in the northern portion of the Yatta Plateau.

Further laboratory investigations on the phosphate-status of the Kikuyu red loam have shown that this class of soil exhibits a very delicate equilibrium between its so-called "available" and "unavailable" phosphoric oxide content. There is an immediate replacement from the "unavailable" reserves as the more available portion is removed; again added phosphates show an equally rapid change over into the temporarily "unavailable" form. The results suggest that, in the special case of these acid laterized red soils, the cheaper forms, such as mineral phosphates, are at least as suitable as the more expensive chemically prepared, water-soluble forms. The less soluble forms, such as mineral phosphates, guanos and bone meals, are less likely to be uniformly fixed by the soil colloids, and would therefore remain as local centres of less slightly available phosphate, which can be better distributed throughout the soil and also better absorbed by direct contact with the

feeding root system of the plant. In the case of the Kikuyu red loam, which is the major coffee soil of the Colony, the true availability of different types of phosphatic fertilizers will have to be tested by using the performance of the plant itself as an indicator.

SOIL EROSION.

During the year it became evident that the increasingly serious problem of soil erosion, in both European and native areas in the Colony, was not receiving sufficient attention; it was decided, therefore, that even more strenuous efforts must be made by the Plant Industry Division of the Department of Agriculture to bring home the perils of soil erosion to all sections of the community.

A bulletin on "Soil Erosion" was written by the Senior Agricultural Chemist, emphasizing the danger of widespread ruination of the lands of the Colony, describing the way in which soil erosion occurs and methods in which it may be controlled. This bulletin was published at the beginning of the year and a copy sent to every farmer in the Colony, and to every administrative officer and agricultural officer.

Later in the year memoranda on "Soil Erosion", "Deforestation and a Land Utilization Survey" and "Steps taken to Combat Soil Erosion in Kenya Colony", prepared by Mr. Colin Maher, Agricultural Officer, were sent to the Colonial Secretary and to the Economic Development Committee. The first memorandum included the outline of a land utilization scheme, for the consideration of Government and the Economic Development Committee, in which the prevention of soil erosion and deforestation was regarded in its true aspect as part of the great social problem involved in putting all the land of the Colony to its correct use.

At the beginning of the year a 100-acre demonstration of Magnum Broad Base terracing was made by the Agricultural Officer on an eroding field with slopes of 3 per cent to 6.8 per cent on Mr. G. C. A. More's farm near Kitale, with the help of the owner, for the instruction of farmers in the Trans Nzoia, many of whom began to put their maize lands under broad base terraces during the year. This terracing demonstration was very successful in checking wash during the year.

A demonstration of broad base terracing was laid out on a badly washed field on a steep slope on the Plant Breeding Station, Njoro, early in 1935, the work being performed with

a Martin Ditcher kindly lent by Messrs. G. North and Son, Ltd. Farmers who visited the Station were shown this field and the work done proved very satisfactory. The use of Napier grass as a stopwash is being demonstrated also on the Plant Breeding Station.

A field of about forty acres in extent was laid out on Mr. E. J. Radcliffe's farm at Mau Summit towards the end of 1935; the work of constructing the terraces was done by Mr. Radcliffe. The field is on a very steep slope and has been badly washed in the past. It is hoped that this may prove useful as a demonstration to farmers in that area.

It is not considered necessary to establish a demonstration at Rongai as Mr. Whitmore has done a very large acreage on his own farm and this has been demonstrated on several occasions to farmers in the area.

Two simple levelling instruments were made and tried out both on the station and in demonstrations to farmers.

Demonstrations of the use of broad base and narrow base terraces and of box ridging for the control of erosion were prepared at the Scott Agricultural Laboratories for the instruction of visiting planters. The comprehensive soil erosion exhibits, which were constructed as part of the propaganda against soil erosion by the Department at the Nairobi Agricultural Show, have already been mentioned.

The urgent necessity for checking soil erosion on farms was stressed at all meetings of farmers attended by members of the Division, as well as in informal discussions. The work on the control of soil erosion in native areas is described in the reports relating to the three Provinces.

During the year the Division offered a service to farmers under which scheme officers of the Department were sent to give addresses on soil erosion and demonstrations on means of control, including terracing, to Farmers' Associations in various parts of the Colony. Advice was also given on several individual farms.

Close co-operation was maintained during the year between the Department of Agriculture and the Kenya Arbor Society. The society, infused with the enthusiasm of Major and Mrs. E. H. Ward, the hon. General Secretary and the hon. Propaganda Secretary respectively, is assisting the Department

materially by propaganda and meetings in its fight against the deterioration and destruction of the resources of soil and water of the Colony.

The maintenance of adequate forests and the use of wind-breaks are intimately related to the prevention of soil erosion and the desiccation of the Colony. It is pleasant, therefore, to record that the most cordial co-operation has been received from the Forest Department in matters connected with these important subjects.

The rousing of public interest in a subject so vital but yet, to the layman, as superficially dull, as that of soil erosion, is no easy matter. It is all the more gratifying to state that assisted by the continued help of the local Press, public interest is being roused by the efforts of the Department, and it is beginning to be understood that the preservation of the resources of Kenya is a question in which the whole community is intimately concerned, and on which the future beneficial occupation of Kenya will stand or fall.

The opportunity is taken of expressing the appreciation of the Division of the excellent work done in this important cause by Mr. Wolryche Whitemore, farmer of Rongai and member of the Board of Agriculture and of the Land Bank Board, Mr. Robert Barnes, farmer and civil engineer of Hoey's Bridge (pioneer in the use of Magnum Broad Base terraces in Kenya), Mr. V. A. Beckley, Senior Agricultural Chemist, and Mr. Colin Maher, Agricultural Officer. These gentlemen have been in the forefront of the fight against soil erosion and practical demonstrators of the measures necessary for avoiding its disastrous effects.

NATIVE AREAS.

Reference should be made, for details of the work, to the reports of the Agricultural Officers in charge of the Provinces which appear in this Report. The following paragraphs recite the results and the more important matters of administration.

The cessation of the cycle of drought and locust invasion has revealed the progress which has been made in the Native Reserves of the Central, Nyanza and Coast Provinces for the improvement of the native food and cash crops. The work of trial of plant introductions, multiplication of seeds and distribution of these was severely handicapped for some considerable time but is now proceeding favourably with the return of

good seasons. The complementary work of inspection of produce has assisted very greatly the work of improvement of crops in raising the standard of the native produce of the kinds sold out of the reserves.

FAMINE PREVENTION.

The work which was taken in hand in 1931 for the introduction of a large number of drought-resistant food crops, as well as selection for drought-resistant strains of local varieties, for trial in the areas subject to occasional famine, is now showing substantial fruit. The three years before 1935 were a very severe test of the drought-resisting qualities of many of these crops, but were, on the other hand, unfavourable for multiplication of the proved kinds.

In the Coast Province tepary beans, improved varieties of pigeon peas, early maturing types of maize, sorghums and millets are now being multiplied as quickly as resources permit, and a fair amount of distribution amongst natives has taken place. In the Central Province two varieties of sorghums, one of an early maize, a selected awned bulrush-millet, tepary beans and a hardy type of cow-pea are being bulked for distribution. In the Nyanza Province tepary beans, pigeon peas, early maturing types of maize, as well as locally selected types of sorghums and eleusine millets are now being rapidly bulked.

In addition to the work described above, prominence is given to increased plantings of such established native drought-resistant crops as cassava (Mosaic-resistant selections), sweet potatoes and bananas; and the rapidly-expanding, drought-resistant cotton crop is beginning to prove its value as an insurance against the provision of funds for famine relief.

Strong persuasion, in certain reserves, with active assistance by the officers concerned, is being exercised for the drainage and cultivation of swamps, as a means of increasing the food supplies of the natives, while propaganda continues for the better cultivation of crops to enable them to withstand more easily the recurrence of prolonged drought periods.

In general, it begins to be evident that if the present efforts of the Department are continued and supported by certain administrative measures which are regarded as necessary, the danger of famine in the main native reserves will very soon be negligible as compared with the state of affairs which existed a few years ago.

CASH CROPS.

Cotton.

The following figures show the increase that has taken place during the last six years in the production of cotton in the Colony.

YEAR	NYANZA PROVINCE	COAST PROVINCE	CENTRAL PROVINCE	TOTAL PRODUCTION
	<i>Bales</i>	<i>Bales</i>	<i>Bales</i>	<i>Bales</i>
*1930-1 ..	740	43	—	783
1931-2 ..	1,257	478	—	1,735
1932-3 ..	3,219	1,057	—	4,276
1933-4 ..	5,690	1,059	—	6,749
1934-5 ..	7,208	1,567	—	8,773
1935-6 ..	11,830	3,617	189	15,636

*The first year shown is the year of planting; ginning extends into the following year.

In the Central Province the 1935 crop was experimental and is expected to show a large increase in 1936, as over 15,000 acres are being planted.

The proportions of first quality (clean) and second quality (dirty) cotton in the Nyanza and Coast Provinces in 1935-36 were as follows :—

				<i>First.</i>	<i>Second.</i>
Nyanza Province	...	...	11	...	2
Coast Province	...	...	11	...	4

The number of ginneries in the Colony is as follows :—

Nyanza Province	...	...	...	5
Central Province	...	...	...	1
(and 1 in course of construction)				
Coast Province	...	...	...	3

In addition to ginning the crop, the ginners provide seed, with transport, for the following season's crop.

The total production from the 1935 planted crop represents a revenue of about £163,700.

Although it is clear that we can do no better in the greater part of the Nyanza cotton area than follow the Uganda lead in the matter of varieties or strains to be grown, in the Coast and Central Provinces this is still very much a matter of experiment. Central Province cotton approximates to

Nyanza in quality (including staple) when the same variety is grown, which gives hope of a successful industry; Coast Province cotton, however, is inferior to these.

In regard to pests, the Coast still has the pink boll worm, from which the other areas are free; stainer is universal, but not bad except in the Central Province, where an energetic campaign is in hand for making a regular practice of daily hand-picking by the women and children on the individual *shamba*; the ginner is providing 10,000 empty tins for this.

During the year, Mr. S. Milligan, of the Empire Cotton Growing Corporation, toured the cotton-growing areas of the Colony, and was able to give the benefit of his valuable experience to officers concerned with this crop. His general opinion was that, while certain areas were very suited to the growth of this crop, advance must be cautious and there must be no lagging of the progress of the investigational work, especially that relating to varietal trials and breeding, behind that of the extension work. He considered that additional subordinate staff should be provided to permit the trained agricultural officers spending a larger amount of time on the cotton experimental work.

Maize.

An increased amount of maize was grown in the Kivirondo districts for supply to the mining areas. The quality of maize showed much improvement, especially that grown in the North Kitosh Reserve. This improvement in quality was also marked in the Kikuyu districts of the Central Province.

Wattle.

The planting of wattle has continued in the Central Province, where the natives now recognize it to be an excellent economic crop, since the quality of the bark is now first-class and the demand is good; the wood is usable or saleable, and the tree improves soil texture and fertility. The acreage increased by about 50 per cent to nearly 100,000 acres, chiefly on exhausted or eroded lands and steep hillsides.

Oil Seeds.

These barely hold their own in competition with other crops. Increases in the production of simsim in certain parts of the Nyanza Province were countered by decreases, due to low prices or unfavourable seasons, in others. An increase in production is anticipated, however, since simsim prices are rising and the crop can well replace the surplus maize production, which can only be disposed of at very low prices.

Groundnut exports from Nyanza Province increased to 522 tons, nearly three times the 1934 crop, chiefly from South Kavirondo. The quality is now excellent.

Beans.

There was a further increase of the area under beans in the Central Province, and an export was started from South Nyeri. Different varieties have been selected for different districts, in order to avoid flooding the market with one variety. In areas in which they succeed beans are a better crop for natives to grow than maize, which is usually sold at a very low price.

Potatoes.

Large quantities of potatoes are now being produced in Kiambu and South Nyeri, and an export trade to Bombay is developing satisfactorily.

Coffee.

Coffee nurseries were established during the year in the Nyanza and Central Provinces, in order to provide plants for natives wishing to grow this crop. A small amount of Robusta seed was obtained from Uganda for trial in the hotter, more humid areas. At present there are 46 acres of native-owned coffee in the Kisii highlands, 27½ acres at Meru and 19¼ acres at Embu.

Cashew Nuts.

The cashew nut industry continues to develop favourably at the Coast, and improvements in the factory should result in an improved product. The 1935-36 crop promised well, but harvesting was prolonged by rains at the end of the year.

IMPROVEMENT OF CROP VARIETIES.

Improvement of this kind is accomplished by plant introductions and from selection (for yield, disease-resistance and drought-resistance) from both introductions and local varieties. The principal recent results are given below :—

Sorghums.

Nyanza Province.—Selections of the local varieties, Dobbs and Kano, are now being grown in many areas. These varieties are dwarf, close paniced and early maturing. They are suitable for all sorghum-growing areas.

Central Province.—Sunrise Kaffir, introduced from South Africa : This is resistant to mildew, and is early maturing and suitable for the low zones.

Coast Province.—Bonganhilo, introduced from Tanganyika, a full-season type, and Dwarf Hegari, introduced from South Africa, an early maturing type, are now extensively in cultivation.

Millets.

Awned Bulrush, from Tanganyika : This variety is being grown in all Provinces, further selection being concentrated at Fort Hall, but also proceeding at the Coast. It is bird-proof and a heavy yielder.

Eleusine : Bukura, a very early maturing and comparatively drought-resistant strain, selected from a local variety, is now being grown in many parts of Nyanza Province, and has been introduced in the Coast Province.

Foxtail Millet : A Central Province selected type is successful in both this Province and the Coast. A strongly awned type has been selected at the Coast for resistance to bird attack.

Beans.

Nyanza Province.—Selected Rose Coco and Canadian Wonder, both introduced, and now being grown.

Central Province.—The above varieties, and, in addition, Painted Lady, are grown and exported largely.

Coast Province.—Tepary beans are outstandingly successful for the drier Coast areas.

Pigeon Peas.

Nyanza Province.—The introduced strains, 15 and 16 from Pusa, have given good results. They are early maturing, high yielding and drought-resistant.

Groundnuts.

Selection for immunity to wilt disease is proceeding at the Coast. Introduction of bunch varieties is contemplated in Nyanza.

Cotton.

Selection work to obtain a variety suited to the local conditions has been begun in the Coast Province. Successful recent introductions have been N 17 and its derivatives from Uganda for Nyanza ; U/4/4/2 at the Coast.

Cassava.

Selection work for resistance to mosaic disease is proceeding in the Coast Province. The strain Malindi is both resistant, high yielding, and liked by natives.

Rice.

Introduced and selected local varieties of rice are giving promising results in the Coast and Nyanza Provinces. In Nyanza, the best results have been given by Mwanza Sena (from Tanganyika), Bungala (in North Kavirondo), and Masiwa and Kisuri (in South Kavirondo). Semi-upland strains of Mumias have been re-introduced in Wamia. In the Coast Province, the varieties Peshauri (from Calcutta), Sindano (from Dar es Salaam), and Halkaduwi have given the best results.

Tobacco.

The introduced Western Dark Nyasa type has given good results in Nyanza.

In addition, intensive breeding and selection work with maize (for yield and also for resistance to white blight and pink ear rot) and with different classes of beans (for resistance to bacterial blights) is proceeding at the Njoro Plant Breeding and Experiment Station, which will be of considerable benefit to the native areas, as will also the wheat-breeding work at Njoro and the coffee-breeding and selection work at the Scott Agricultural Laboratories.

SEED FARMS.

The following were the issues in 1935 of bulked seed of improved varieties in the three Provinces from these farms, which are supported financially by the Local Native Councils :

	CENTRAL PROVINCE	NYANZA PROVINCE	COAST PROVINCE
	<i>Bags of 200 lb.</i>	<i>Bags of 200 lb.</i>	<i>Bags of 200 lb.</i>
Maize	833	350	76
Eleusine	—	34	—
Sorghum	26	57	10
Groundnuts	—	62	—
Potatoes	349	32	—
Beans	127	—	—
Gram	14	—	—
Awned Bulrush Millet ..	40	—	9
Victoria Peas	15	—	—
Wheat	17	—	—
	<i>Tons</i>	<i>Tons</i>	<i>Tons</i>
Napier Grass	80	—	—
	<i>200 lb.</i>	<i>200 lb.</i>	<i>200 lb.</i>
Foxtail Millets	—	—	12
Cowpeas	—	—	14
Tepary Beans	—	—	59

Omitting the small bulking plots, the numbers and acreages of these seed farms are as follows :—

	Number	Total Acreage	Acreage under Cultivation
Central Province.. ..	10	393	325
Nyanza Province . . .	3	—	124
Coast Province	2	130	100

The acreage under cultivation includes experimental plots, fallows, pastures, etc.

FODDER TREE ARBORETA.

A fodder-tree arboretum has been established at Machakos, and this is to be done as well at Naivasha, Rongai, and a centre to be selected in the Masai Reserve. The following trees are to be grown :—

Machakos.

Disperma trachyphythus,
Acacia spirocarpa,
Brachychiton rupestris,
 Australian saltbush,
Leucaena glauca,
Prosopis juliflora,
Brachychiton populneus,
Casuarina stricta,
Celtis simensis,
Eucalyptus microtheca,
Eucalyptus albens,
Eucalyptus melliodora,
Phytolacca dioica,
Eucalyptus cladocalyx.

Naivasha.

Leucaena glauca,
Brachychiton populneus,
Brachychiton rupestris,
Casuarina stricta,
Eucalyptus microtheca,
Phytolacca dioica,
Celtis simensis,
Eucalyptus cladocalyx,
Eucalyptus albens,
Eucalyptus melliodora.

Rongai.

Leucaena glauca,
Brachychiton populneus,
Brachychiton rupestris,
Casuarina stricta,
Eucalyptus microtheca,
Phytolacca dioica,
Celtis simensis,
Eucalyptus cladocalyx,
Eucalyptus albens,
Eucalyptus melliodora.

Masai.

(Species to be planted not yet decided.)

NATIVE AGRICULTURAL TRAINING.

*Central Province.**Scott Agricultural Laboratories School.*

A total of 59 apprentices were in residence at this school during 1935. These were all derived from the Central Province with the exception of four from the Coast and six from the Masai district. Twenty-six apprentices completed their course of instruction in December; of this number, six obtained work with the Department or with Local Native Councils; most of the remainder returned to their own holdings, but several had no land.

The tribal analysis was as follows :—

					Total Number in Residence During the Year
CENTRAL PROVINCE—					
Kiambu District	..	..	..	..	10
Fort Hall District	..	..	..	..	8
Meru District ..	..	..	..	..	4
Nyeri District ..	..	..	..	..	13
Embu District ..	..	..	..	..	3
Machakos District	..	..	..	..	6
Kitui District ..	..	..	..	..	5
COAST PROVINCE—					
Kilifi District ..	..	..	..	..	1
Teita District ..	..	..	..	..	3
MASAI EXTRA PROVINCIAL DISTRICT—					
Narok	..	..	..	..	6
TOTAL ..					59

Difficulty was experienced in 1935 in filling the vacancies with boys having the Primary School Certificate, which is the qualification now required; thus there is a tendency for new

boys to be drawn mostly from Nyeri and Machakos, since there are schools in those districts at which the education necessary for passing the examination can be obtained.

In the past the average age of boys on admission to the school has been eighteen years or more, but the certificate requirement has reduced the average age considerably.

The standard of instruction in school subjects was raised, but the small amount of time allowed for these subjects during the week and the tendency for physical tiredness to reduce mental efficiency rendered the scale in achievement in this direction rather low. However, it is considered desirable that the teaching of school subjects to the boys who have already passed the Primary School Examination should be continued, in order that they shall not retrogress in point of development of intelligence and mental efficiency. During the year the system of individual school gardens has been discontinued and the land was devoted to demonstrating crop cultivation and market gardening, while senior boys received special instruction in the management of smallholdings.

Nyanza Province.

Bukura School, North Kavirondo.

African apprentices of the Kavirondo Bantu, Luo, Suk, Kamasia, Marakwet, Elgeyo, Nandi and Lumbwa tribes are given a practical training in agriculture at this station.

In 1935 six recruits were engaged and 23 third-year apprentices were discharged at the end of their course of training. A total of 48 were in training during the year.

The tribal analysis was as follows :—

TRIBE				Total Number in Residence During the Year
North Kavirondo Bantu	..	..	..	17
Central Kavirondo Luo	..	..	..	7
Central Kavirondo Bantu	..	..	..	1
South Kavirondo Bantu	..	..	..	8
South Kavirondo Luo	..	..	..	2
Kamasia	..	..	..	2
Suk	..	..	..	2
Elgeyo	..	..	..	2
Marakwet	..	..	..	1
Nandi	..	..	..	3
Lumbwa	..	..	..	3
TOTAL				48
Agricultural	..	..	..	35
Pastoral	..	..	..	13

Of thirteen apprentices discharged at the end of the year, nine were employed as instructors and two as teachers. There is a steadily increasing demand for instructors of the pastoral tribes. A modified curriculum was introduced at the beginning of the year, in which preparation for the Primary School Examination is separated from agricultural training. Sixteen apprentices and one instructor sat for the Primary School Examination. There were no passes. Of those leaving at the end of the year, only one passed the leaving examination in all subjects.

The arithmetic and farm observation papers set in this examination showed that the apprentices had badly developed powers of observation and indicates that emphasis must be given to training in the practical implication of their studies. The house prefect system continued to work satisfactorily, and discipline generally was good. The annual refresher course, lasting two weeks, for instructors was held in August, and was attended by eight instructors and seven masters from the Maseno Central School (Church Missionary Society).

General.

It is evident that increasing difficulty will be experienced in the future in providing employment for apprentices who have completed their courses at the Native Agricultural Training Centres. It is stated that it is unlikely that many of the 1935 apprentices who left at the end of the year will be able to obtain employment as instructors in the Nyanza Province. Similar difficulty is mentioned in the report from the school at the Scott Agricultural Laboratories, while the presence of landless apprentices aggravates the problem. The boys are young when they leave the school, and so are unable to obtain work on European farms and plantations except as labourers, and the effort and expenditure involved in training these natives is largely wasted in such circumstances; at the same time a young native carries less authority in his reserve as an agricultural instructor than does a native of more mature years. There will be perhaps an increased opportunity in the future for agricultural instructors to obtain posts in the more backward pastoral areas, where the tribes are turning over to agricultural or mixed farming to a limited extent. Nevertheless, it is more satisfactory for instructors in these latter areas to be of the same tribe as the natives for whom they are working, since they are then apt to obtain a greater measure of confidence from the local natives. Unfortunately, natives from the non-agricultural tribes have rarely proved successful when

trained as agricultural instructors. It appears that the training given at these Native Agricultural Training Centres must be largely based, in the future, on the idea that the majority of the pupils will return to work their own smallholdings in their reserves. The provision of land for landless natives, who are capable of becoming useful agriculturists in their own community, is a problem which must be met by the local tribal authorities. If such a view is taken, then even less emphasis must be placed upon school subjects, except for a limited number of the more intelligent boys, destined to become agricultural instructors, and more attention than ever paid to instructing the apprentices in arts which may be of value to them in their future life in the reserves.

Smallholdings.

Mixed farming on smallholdings provided part of the training given to apprentices at both the Scott Agricultural Laboratories School and Bukura. At the Jeanes School, Kabete, also, a holding has been used in the agricultural instruction of the teachers and others in residence.

These smallholdings are actually operated by selected natives as an independent farming enterprise; complete accounts are kept in order to judge the profitability of the farming.

The separate reports of Mr. Walford, of the Jeanes School, and the Agricultural Officers, Scott Agricultural Laboratories and Bukura, on these three smallholdings are extracted in a summarized report and published in Vol. II.

INVESTIGATIONAL WORK, 1935.

Coast Province.

The report for the Coast Province is taken entirely from the report of the Kibarani Station by the Agricultural Officer in charge.

Development of the new Coast Experiment Station at Kibarani has proceeded during the year, and though there is still much to be done before the station can be considered fully established, many of the difficulties have been removed and a more ambitious programme of work can be undertaken.

Maize Variety Trials.

A variety trial of maize was laid down at Kibarani and at a plot at Vitengeni in the dry area of Kilifi district. Of the

four varieties tried, Durum was significantly better at Viten-geni than the others—Muratha, Guam and Yellow Menado. At Kibarani, Durum and Guam were significantly better than the others.

It is a point of considerable importance that the drought-resistance of Durum is a definite quality, and it is not, as in the case of the others, chiefly due to quick maturity. Durum is now the accepted variety for the drier areas of the Coast.

Sorghum Variety Trials.

Although in this experiment shortage of seed prevented sufficient replications for statistical purposes, there is no doubt that in Bonganhilo the Coast has a good full season and heavy-cropping sorghum, and in Dwarf Hegari a suitable early maturing type. Future work will be concentrated on these two kinds.

Foxtail Millet.

This crop was being bulked and it was noted that a proportion of the plants were awned. The possibility of obtaining an awned type, which would be largely birdproof, encouraged the selection of a number of these awned types, and opportunity was taken of the short rains to sow some of these selections, others being reserved for the long rains of 1936.

Eleusine Millet.

A variety obtained from Kavirondo proved very satisfactory, and is a further addition to our drought-resisting crops.

Groundnuts.

Selection work for a variety immune to wilt disease continued. Though self-fertilization is considered to be the usual procedure with groundnuts, a few plants of each selection were caged to ensure obtaining self-fertilized progeny.

For the first time, four strains came through the season without any plants going down to wilt disease. All plants of these four were harvested separately, and, in addition, all caged plants that showed no signs of wilting. Without being too optimistic, it is not too much to hope that we are now not far from reaching the desired goal.

Simsim.

A white variety from Nyasaland suffered from poor seasonal conditions. Seed was obtained, however, and it will be tried again next year. A small quantity of white seed, mixed with a little black, that had come from Lindi, was sown and the plants grew well. Selections of a few white-seeded plants

were made and sown in the short rains, the remainder being held over for next season. It is too early to comment further on this work, though that of the coming season should be of very great interest.

Cotton.

The importance of obtaining a variety of cotton suitable for Coast conditions increases with the development of cotton growing. The presence of jassid and the need for a variety especially suited to dry conditions led to the introduction of U4 bulk at the end of the year.

In the present year this U4 bulk was grown on a larger scale, whilst a number of Barberton varieties were received from Kavirondo, and were sown as a variety trial. All varieties were in full flush when Mr. Milligan visited the station, and he was able to examine their behaviour under Coast conditions.

Of the Barberton varieties, 920 was outstanding in general characters, and also gave the highest yields.

The U4 bulk introduced in 1932 is being abandoned in favour of U4 bulk direct from Barberton.

N17 from Uganda promises well, and S.P.20 is under trial.

Cassava Variety Trial.

This trial gave significant results. The variety known as Malindi was significantly higher in yield than any of the others. This variety is very strongly resistant to mosaic disease, and, as it is liked by natives, it may be taken as the basis for future work on the improvement of this crop.

Shelli-Shelli was significantly better than Mwabayanyundo, and almost so over Binti Athmani. As a quick growing variety it is useful, but does not rank high in native taste.

Cowpea Variety Trial.

Of the various introduced varieties of cowpeas, only three have been retained: Morogoro, New Era, and Arlington. In the present trial, Morogoro proved significantly higher in yield than the others. All three varieties have attractive characteristics, however, and the trial is being continued.

Rice Varieties.

Rice trials began at Kau on the Tana River in 1934, and were continued in the present year.

The chief requirement is a good short-season variety for the middle and upper Tana. There are one or two promising

varieties in hand, which it is hoped to try over a wider area next season. Red varieties are not popular with the natives, but of those imported from India, Sudu Heenati is considered the best, though the white variety from Tanganyika, called Karossa, is preferable. This variety matured in 102 days, which was as quick as the Indian types, and gave a heavier yield than any of the others. It has done well since its first trial, but there is still some doubt as to its milling qualities.

Tobacco.

A field trial of this crop with acclimatized Nyasaland Western was carried out, and samples of the cured leaf submitted to the British-American Tobacco Co. for favour of their opinion. The results are not yet to hand, but it is proposed to continue the work.

Soil Fertility Experiments.

Series of experiments on the maintenance and improvement of soil fertility have now been started, and should prove of the greatest value in due course. They are as follows :—

Laid Down 1934.—Manurial Treatment of Coco-nuts (non-statistical) : This experiment is still in progress. There has been a visual improvement in coco-nuts grown with Mauritius beans as a cover crop, but no other comparisons are possible yet.

Laid Down Long Rains, 1935.

- (a) Ridge planting *versus* flat planting. Ridge *versus* flat is also being incorporated in all the following experiments.
- (b) Effect of turning in green matter compared with—
 - (i) no green matter ;
 - (ii) burning and turning in the ashes.

Short Rains, 1935.

- (a) Green mauling experiment : Effect on subsequent cereal crops of—
 - (i) fallow ;
 - (ii) cereal crop ;
 - (iii) cowpeas turned in green ;
 - (iv) cowpeas harvested and plants then turned in ;
 - (v) cowpeas harvested, remains burned and turned in.
- (b) Soil renovation experiment : Relative value of fallow, pigeon peas, Napier grass, and Mauritius beans.

Miscellaneous Crops.

Oil palms have made good progress, and have begun fruiting. Samples of the nuts are being sent to England for report in the New Year.

Introduced kapok varieties are also beginning to come into bearing, and should be of interest in the next year or two.

Other crops under trial included cover crops and fodder crops, work on which will be continued.

*Central Province.**Miscellaneous Crop Trials.*

Yield trials of seventy-nine varieties of crops carried out during the year at the various Local Native Council seed farms in this Province yielded some valuable results, indicating several varieties of sorghum, maize, pea, ginger, millet and bean well suited to the conditions obtaining in the several agricultural zones of the Province.

Of the sorghums tried, Sunrise Kaffir and Boganhilo yielded over six bags per acre at Fort Hall; Kano yielded over five bags per acre at Kitui, and Dobbs yielded over five and a half bags per acre at Machakos. Of the maizes tried at Kitui, Guam and Durum yielded thirteen and a half bags per acre, Muratha yielded thirteen bags per acre, but Yellow Menado yielded only seven bags per acre. Selected Awned Bulrush millet from Tanganyika gave a yield of seven bags per acre at Kitui. Valley ginger yielded 15,120 lb. per acre at Fort Hall.

Seed Selection.

In the work of seed selection the wide range of climatic and soil conditions occurring in the Province necessitates the development of strains suited to varying conditions incidental in the different zones. The characteristics required for each crop in each zone are therefore determined and work is systematized.

*Bean Variety Trials.**

A variety trial of Noyeau Blanc, Canadian Wonder, Rose Coco and Painted Lady beans was completed, and proves Noyeau Blanc and Canadian Wonder to be better yielders than Painted Lady.

Cotton Variety Trials.

Trials of U/4/4/22 and Nyanza strains of cotton were carried out over the lower zones of the Province, the observed result being that U/4/4/22 was the higher yielder. Ratooning trials were carried out, but in all cases the ratooned crop failed to mature before the "close season" commenced.

Maize Variety Trials for Low Zones.

A statistical variety trial of Guam, Durum, Yellow Menado, and Muratha maize was made at Itabua. Muratha and Durum both gave yields that were significantly better than Guam.

Sweet Potato Variety Trial.

A trial of nine varieties of sweet potato was carried out, from which it appeared that the variety Muganda gave the best root yield and that Kiburi gave the best yield of tops for fodder.

The position in regard to experimental work is unsatisfactory. Extension work claims a large part of the time of the Agricultural Officers, who cannot give the necessary time to investigational work. An experimental station and the whole-time services of a qualified officer are required in this Province.

Soil Fertility Experiments.

In this Province, approximately six hundred square miles of land contain soils of a light texture which lose fertility rapidly under cultivation. Manurial experiments have shown that organic manure and lime gave increased crop yields. Natives being unlikely to be able to afford such dressings, cheaper methods of recovering soil fertility have been investigated.

An observational strip experiment was laid down in 1934 on the upper slopes of Mount Kenya, providing four different treatments replicated three times :—

<i>Treatment.</i>	<i>Mean Yields.</i>
(a) Kikuyu grass cover ...	8,440 lb. per acre.
(b) Thatching ...	10,360 lb. per acre.
(c) Deep ploughing ...	6,160 lb. per acre.
(d) Bare fallow ...	3,920 lb. per acre.

The yields are of potatoes planted in March, 1935, following the ploughing of all the treatment plots.

Nyanza Province.

Statistical investigational work is carried on only (with few exceptions) at Bukura School Farm. At other stations extension work leaves no time for officers to engage in statistical investigational work.

Soil Fertility Experiments.

Four soil fertility and rotation experiments started in 1935 are being conducted at Bukura. In all cases, maize is the control. Experiment 1 is of two years' duration. It is to test the effect on soil fertility of separate *versus* mixed planting; weeds *versus* clean weeding; ploughing in of green manure, and application of compost.

Experiment 2 is similar to the above, but will run for three years, and is extended to include pasture and Napier grass ley treatments.

Experiment 3 is of seven years' duration, and is designed to test the effects on soil fertility of planting mixed crops in strips *versus* haphazard mixed planting, *versus* haphazard mixed planting for four years, followed by bush or ley *versus* a definite food and cash crop rotation, including a ley and without a ley. Thus, in effect, existing native methods are tested against European methods.

The results of these experiments are not yet available.

Experiment 4 was a one-year observational, non-statistical trial of the effect on subsequent crop growth of two *Crotalaria* green manures *versus* weed fallow unploughed *versus* ploughed fallow. Weed fallow gave the highest yield, but the green-manurial treatments gave the healthiest growth.

At Kakamega an experiment dealing with one aspect of Bukura Experiment No. 3 is in progress. It tests Napier grass as a soil rejuvenator over a definite period against continuous mixed cropping in rows and haphazard, for the same period. While interim results have been recorded, it is too early to draw conclusions from this experiment.

Interplanting Trials.

Miscellaneous interplanting trials have been carried out in three areas during the year. The treatments included the interplanting of maize with groundnuts and beans; sorghums interplanted with groundnuts and beans; maize and groundnuts; cotton interplanted with groundnuts and simsim; and

eleusine and groundnuts. The maize and groundnut plots were successful, the groundnuts spreading well. Groundnuts planted with cotton were not successful, the cotton being too low growing to allow the groundnuts to spread.

Sorghum.

Trials of the local varieties, Dobbs, Kano, Usudi, and Ik'umba, were conducted at the Kano plot. Kano was the most early maturing, requiring 105 days, Dobbs requiring 109 days. Kano yielded 14 bags per acre, Dobbs 11 bags per acre, and Usudi 12 bags per acre. At Kakamega, the local varieties were markedly superior to all introduced varieties tried. The varieties selected locally, Kano and Dobbs, are outstandingly the best varieties under trial.

Millet.

Six introduced varieties of Eleusine millet were tried against the selection Bukura as control, at Kakamega and at Kano. In both places Bukura was considerably earlier than any other variety and yielded more heavily (11 bags per acre).

Rice.

Rice trials were conducted at Kano and Kendu. Halkaduwi, Mwanza Sena and Bungala did best at Kano, and Masiwa and Kisuri did best at Kendu. The cultivation of Mwanza Sena and Bungala is being encouraged in the Province.

Soya Beans.

The Soya beans Ootootan and Brownie gave the best results in a trial at Kano. Malayan imported varieties failed.

Pigeon Pea.

Pigeon pea trials showed that Pusa types 15 and 16 gave the best results on the plains at the Kano plot, but failed at Bukura, over 1,000 feet higher, with different soil conditions. The Indian varieties, EB2 and EB3, gave the best results at Bukura.

Sweet Potato.

Sweet potato trials at Bukura have been concluded. The variety Uganda is definitely superior to any other tried.

Fodder Crops.

Hubam clover is under trial at Bukura and Kakamega, and is promising as a fodder crop.

SOIL FERTILITY AND MIXED FARMING.

It is necessary to repeat at intervals the warning which was given in my 1931 Report. The following is an extract from that Report :—

“ The Main Problem.

“ Much as may be done to improve and increase production by the means described above, they do nothing to solve the serious problem of depletion of soil fertility, which is facing a large part of the Kikuyu and Kavirondo Reserves. On the contrary, they aggravate it by increasing the produce surplus to family needs which is sold out of the reserves. Nothing is returned to the soil to make up for this annual drain of plant foods. In the Kikuyu Reserve particularly, the process is causing this Department great anxiety. Over the greater part of the reserve no cattle are kept on the agricultural holdings but, instead, in communal grazing areas at lower altitudes at some distance from these holdings. The compost pit has been introduced, but it can be of little assistance without farmyard manure. The native will not give up his land to green manure crops and will not buy fertilizer. It is to be taken for granted that in his present circumstances he cannot afford to do either. Excessive land fragmentation complicates the problem.

“ Smallholdings the Remedy.

“ An experimental smallholding of four acres was established by the Agricultural Officer, South Kikuyu, in 1930-31 as part of the agricultural training and educational work with natives at the Scott Agricultural Laboratories, which is under his charge. In order to ascertain if a suitable living for a native family could be derived from it, in 1931 it has been worked entirely, though under the guidance of the Agricultural Officer, by a native agricultural instructor, who had taken the educational course mentioned. Its design is to provide food crops, cash crops, and live stock pastures with the necessary buildings, animals and machinery. The operation of it was entirely successful, showing a substantial profit for the year, after allowing for depreciation in value of buildings and machinery and appreciation in value of live stock. The success of this experiment has pointed the way to a practical solution of the serious problem described above : rotational arable and pastoral fields, with manure and compost applied to the crops, in smallholdings, organized within the native system of land tenure. The size of the holding will vary with the natural fertility of the soil and

the numbers of the families in the area; the extent to which future generations and increasing size of families and dependents should be taken into account being a matter for the consideration of the Administration. An experimental smallholding is in course of establishment by the Department at its Bukura Station in the Central Kavirondo Reserve, and the movement is spreading to the Ukamba Reserve.

“ It is desired to say that the significance of this should not fail to be appreciated by those in charge of the well-being of the natives. It cannot be expressed too strongly that maintenance of soil fertility is the essential basis of the contentment of these people, and that depletion of fertility in areas where shifting cultivation is at or near its end, owing to scarcity of land, must lead to their complete impoverishment, and possibly, as has happened to communities of European descent in other parts of the world, to land abandonment. The political implications of such a critical situation in native economy will be appreciated.

“ *Experimental Stations and Native Agricultural Training.*

“ It will take years to bring about over any large area the reform outlined above. In the meantime, much assistance could be given towards the proper development of the smallholding mixed farming system by experimentation, accompanied by plant breeding and selection in the reserves. The Department has long wanted a station in each of the two large reserves, to include an agricultural training school for selected natives. All the elements that go to build up a proper agricultural service for these reserves are now being provided except the fundamental one of the experiment station. These regions, Kikuyu and Kavirondo, are valuable reserves of wealth to the country. Tanganyika, which has three experiment stations in native areas, has no region comparable to them in density of population and productivity together.”

The following extracts are taken from my 1932 Report :—

“ *Work for Improvement of Crops and Produce.*

“ In respect of crops, the foundation for the work of improvement, namely, the experiment station, is lacking. The pressing need for stations for the three main native areas has been emphasized in previous reports, but the present financial position of the country will not permit of these. With the paramount necessity of the introduction of

a simple system of mixed farming in these reserves, the experiment station becomes all the more important. Such stations in Nigeria are playing a most useful part in introducing mixed farming among the native tribes. Kenya should not lag behind in this, not merely progressive, but essential and urgent development of safe and sound farming among natives."

" Conservation of Soil Fertility.

" The Department actively continues to demonstrate, by means of model smallholdings, the advantages to be derived from mixed farming, and, by propaganda in the reserves, stresses the importance of the conservation of soil fertility by the use of farmyard manures, rotations, regeneration by wattle, the prevention of waste by the use of composts, and the planting of old lands to grass rather than allowing reversion through the cycle of weeds to a poor quality bush. There are increasing signs that this form of permanent cultivation is attracting the attention of the more advanced members of the community, but the formation of fifteen-acre or twenty-acre smallholdings is greatly handicapped not only by the actual scarcity of land in some areas but also by the traditional system of land inheritance, involving excessive land fragmentation. The bringing about of a change of attitude which would allow of an alteration in native custom is the responsibility of the Administration. It is, as part of the larger problem of land tenure, receiving the attention of the Land Commission."

It is possible to report some progress in this essential agricultural reform (as will be seen in the Central Province report particularly), but in relation to the numbers of the population, the progress is negligible. It will continue to be so until the fundamentals for the change are provided: (a) land consolidation to replace fragmentation; (b) the experiment station. In the meantime, the Department must continue to refuse to encourage, in the closely settled areas, the increased production of crops sold off the farm. The increased planting of wattle on exhausted lands is a mitigating factor, as this leguminous tree has a pronounced regenerating effect on the soil, but it is a temporary mitigation merely, for the legume itself, while converting the soil minerals to more available form, makes no actual addition to plant foods with the exception of the nitrogen drawn from the air; it is, moreover, merely another form of shifting cultivation, which sooner or later must come to a complete end. Mixed planting is encouraged, with one or more legumes in the mixture, but as

green manuring is as yet out of the question, this practice can contribute little to our object in the absence of stock on the farm.

Progress towards mixed farming in the Central Province receives impetus from a number of pressing circumstances to which the more intelligent natives are becoming alive, but it is a poor result of demonstration (mixed farming is practised on each large seed farm), propaganda and natural forces to be able to record only some 1,300 native farmers responding to the movement within five years. It is necessary to say again that the problem is to be regarded as one of Native Administration. It is, indeed, in its association with soil erosion, the biggest, most important, and the most pressing problem in the administration of these particular areas. The problem of land tenure and consolidation is admittedly a most difficult one. The Carter Land Commission Report deals with it faithfully enough, but the most important contribution to the subject in Kenya, by way of pointing a suitable system, has recently been made by the Agricultural Economist, Mr. Liversage, in an article appearing in the March (1936) number of the *East African Agricultural Journal*. In regard to the need of experiment stations, I can do no better than quote from an article on "The Introduction of Mixed Farming in Northern Nigeria" by Faulkner (Director of Agriculture, Nigeria) and Mackie, appearing in the January (1936) number of the *Empire Journal of Experimental Agriculture* :—

" At the outset, therefore, of our renewed effort, the agricultural officers, plant breeders and chemists were constituted into a team of experimenters with instructions to investigate every aspect of the subject. Their objective was to evolve a system of which every detail had been tested and re-tested in field trials and experiments. Subsequent events have proved the wisdom of this procedure; and it is also found that the greater the progress we make in our extension work the more important the experimental work becomes. For now that we have gained the confidence of the farmers, we can less than ever afford to give any advice, by precept or example, which is not based on certain knowledge.

" The preliminary work occupied some six years, and during this period no attempt was made to induce even one native farmer to adopt our methods. The results of the main experiments are given in the Annual Bulletins of the Department, and they show that every detail which could possibly have any important bearing on the problem was

fully investigated. At the end of this period we had reached the stage of having evolved a suitable cheap wooden plough, and had satisfied ourselves that the cattle were suitable for work, were easily trained, and would stand up to the work. We had also carried out many experiments to ascertain the best method of making and utilizing manure, and we were satisfied that the manure from one pair of working animals, properly conserved and applied, would serve to keep some 10 acres of land at a reasonable level of fertility. It is not a very high level, but it was one which is very much higher than that of the ordinary hand-hoed farms, even of those that receive occasional 'kraaling' by Fulani herds. As soon as it seemed certain that the system was thoroughly practical and sound, we made an effort to induce three farmers to give it a trial; so that we might next learn whether our system, which seemed so sound to us, could really be adopted by an ordinary farmer, or whether it would need modification before it could be acceptable to him."

PROGRESS OF GRASSLAND WORK IN NATIVE AREAS.

A large proportion of the area of Kenya is occupied by the stock-owning tribes, and the possibility of development of these tribes is obviously connected closely with the management of grassland. In addition to this, the rapid deterioration of extensive areas of this grassland and the alarming advance of soil erosion within recent years demands the application of remedial measures which, it is maintained, can only come through comprehensive methods of control of grazing.

Reconditioning of Grassland.

Where crop production is important amongst a stock-owning tribe, and some measure of family ownership of land has developed, as amongst the Wakamba, widespread deterioration of the grassland has taken place and soil erosion is increasing rapidly.

In such a case plans for reconditioning must be based on comparatively small areas of land. In general, a system of rotational grazing on extensive areas, limiting the injurious practice of continual early grazing and permitting the seeding of the main herbage species, appears to be the most promising method of attack on the problem of reconditioning the grasslands of the pastoral tribes.

Towards the end of the year a committee was formed in the Ukamba district in order to evolve a scheme for reconditioning the reserve. The system of rotational grazing and

periodical resting of the grazing lands mentioned above, recommended by the Agricultural Officer in Charge, Grassland Improvement, will be incorporated in the proposals of the Committee, which is representative of the Local Native Councils, the Administration, Agricultural and Forestry Departments, and unofficial interests.

*Grassland Management in Relation to Stock Farming
Amongst the Agricultural Tribes.*

In order to maintain soil fertility and to assist the attainment of a higher level of nutrition amongst the natives, it is essential that, wherever possible, animal husbandry shall be included in the normal economy of the agricultural tribes. Fortunately, such tribes as the Kikuyu live largely in the high altitude, high moisture regions, where types of pasture can be developed which are admirably suited to intensive management and the inclusion in a smallholding system.

Demonstrations of the method of development and maintenance of pastures of Kikuyu grass and *Trifolium Johnstonii* have been started at Nyeri. In areas at lower altitudes, where conditions are not so suitable for Kikuyu grass, it will be necessary to conduct experiments to test the effect of intensive grazing on the natural pasture, and to find out whether other grasses, indigenous and exotic, may be planted up with success. The former work has not yet been started, but trials of pasture plants have been established at Fort Hall. Rhodes grass (Australian strain) has shown marked success up to the present.

Work on fodder crops for use in the dry season in various native areas is in progress at several centres. The investigations in progress in European areas on species or strains of fodder crops and pasture plants will, of course, also have value for native areas.

Grass Burning.

It is essential for reliable information to be obtained on the effect of the traditional custom of grass burning on the herbage in all parts of the country occupied by the pastoral tribes. An experiment has been in progress at Ngong which has given a certain amount of information, believed to be applicable to the extensive acacia-grass savanna type of country; but there are a number of further types of vegetation in areas where burning is customarily practised, and information must also be obtained in these areas.

The findings at Ngong, up to the present time, may be summarized as follows :—

(a) An accumulation of the old growth from season to season results in weakening of the dominant type in the herbage, *Themeda triandra*, an increase in the growth of shrubs, and apparently a thinning of the plant stand in general with a consequent increase in the proportion of bare ground.

(b) Preventing the accumulation of old growth by either grazing or burning appears to have had a similar effect in the opposite direction. *Themeda triandra* has remained strongly dominant, and the growth of shrubby plants has been retarded. The ground cover has improved under the heavier grazing treatments.

On the extensive grasslands under native occupation fire is often the only instrument available for clearing this accumulation of dead herbage. If employed in the dormant season, which is usually the case in native grass burning, it is most probable that the practice cannot be reasonably condemned. It is very desirable, however, that further investigation should be made, and with this object in view it is hoped to extend the work at Ngong and to set up simple experiments to determine the effects of grass burning in the different vegetational areas where it is employed by the natives.

Such experiments would follow, as far as possible, the prevalent native practice in the districts concerned, and would be situated at or near centres such as Embu and Fort Hall.

SOIL EROSION.

Increased agricultural development in the native reserves, together with a growing population, is likely to lead to rapid destruction of the resources of the reserves unless it is ensured that the land in various districts is put to its correct use, consideration being paid to the topography and soil type, and unless all suitable means of soil erosion control are employed. Destruction of the soil otherwise is likely to be extremely rapid owing to the restriction of grazing land owing to increased cultivation in some reserves, the diminution of the period of bush fallow or its complete abolition, and the uncontrolled increase of stock in other areas.

It is evidently desirable that a comprehensive long-term policy of land utilization in each native zone should be formulated so that direction of the economic progress of the natives may accord with the needs for permanent welfare rather than with immediate opportunity for increasing wealth.

During the year, work and propaganda on the control of soil erosion was carried out with vigour by the officers in the native reserves. Instructional exhibits depicting land protected from soil erosion and land which was eroding severely as the result of mismanagement attracted a great amount of interest from natives, both at the Nairobi Show and at various agricultural shows in the reserves. Methods adopted and recommended included the following :—

1. Broad base, narrow base, and bench terracing, as the circumstances demand ;
2. The use of staggered trenches on eroded hillsides and grazing lands ;
3. The grassing-down of severe slopes ;
4. Tree-planting on severe slopes ;
5. The purchase of mobile terracing units by Local Native Councils (proposed) ;
6. Control of grass and bush burning ;
7. Bunding of storm ditches ;
8. The avoidance of destruction of vegetable matter and the use of crop residues, etc., for wash-stops ;
9. Stone terracing ;
10. The culling, in some areas, of useless cattle ;
11. The use of rotations and interplanted crops ;
12. The use of compost ;
13. The protection of the bush and forest on the banks of watercourses and gullies ;
14. The planting of elephant grass (Napier grass) or aloes on the contour in order to hold up silt.

Reconditioning officers have been engaged in certain districts by Local Native Councils. The large-scale experiment and demonstration of the reconditioning of pasture land at Machakos by the Department is giving very interesting results. De-stocking alone has been found to be very slow in restoring plant cover to badly eroded land. Stagger trenching soon produces a cover of pioneer grasses, which obtain a foothold in the trenches and the loose earth in the banks ; but stagger trenching together with the planting of star grasses (*Cynodon* sp.) produces a cover which should allow a limited amount of grazing on the area two years after it has been closed to stock.

The obtaining of powers for headmen, under the Native Authority Ordinance, by which they may issue orders for the carrying out of measures by all able-bodied men for the control of soil erosion, is a valuable contribution towards solving some of the difficulties involved in this problem.

INSPECTION SERVICES.

A marked advance has been made in the improvement of the quality of native produce through the operation of inspection services in the main districts of the Central Province and Nyanza Province Native Reserves. The compulsory central inspection of wattle bark was continued in the Central Province, and the largest buyer of dried bark was able to inform the Department at the end of the year that the quotation for Kenya bark in the American market was equal to that for Natal bark, whereas two years ago the difference varied from Sh. 20 to Sh. 30 per ton. This improvement in quality has been obtained at a cost of only 30 cents per ton for inspection services. The quantity of dried bark inspected annually, at seven inspection centres, varies between twelve and fourteen thousand tons. The output of dried bark is not increasing, but that of green bark, for the making of wattle extract, is distinctly increasing; the green bark now undergoes inspection as well, the service having been started towards the end of the year.

In the early part of the year, in the absence of legislation for instituting compulsory central inspection of other exportable products, a voluntary service, in agreement with the buyers, was established at several points in the Central Province, while a similar system continued from the previous year in Southern Kavirondo. Towards the end of the year legislative measures were provided for making the inspection compulsory. The voluntary system worked exceedingly well, but was liable to break down any time in the absence of authority. In the Central Province the produce now undergoing inspection, in addition to wattle bark, consists of maize, beans and potatoes; in the Nyanza Province, the services cover maize, beans, groundnuts and sesame. At centres for inspection of potatoes, sorting machines are provided for the grading of the tubers into sizes specified under the Export Grading Regulations, and maize cleaners are provided for improving the export quality of the maize from K7 upwards. Undoubtedly there is a market for the surplus production of nearly all native crops, if good quality and freedom from mixtures of types can be relied upon. Both the buyers and the natives are pleased with

the results of the inspection services; the former at being able to depend on sale by sample or by definition (such as "Karatina maize"), the latter at receiving a higher price for the improved produce.

Perhaps the greatest improvement this year has taken place in the bean crop in the Central Province, which formerly was of several mixed types and is now rapidly resolving itself into a separation of types and the selection for the particular area of that best suited to its conditions. Towards the end of the year the leading buyer offered Sh. 2/50 per bag more for the pure type than for the mixed, and good exports have taken place. The inspection and sorting of potatoes has brought the native crop substantially into the market for the export trade to India, which is now reaching satisfactory proportions. In regard to maize, the difference in price between the European and the native crop is narrowed to approximately 50 cents per bag in the main areas. In the Nyanza Province a marked improvement in quality is shown, particularly in the simsim crop.

No definite inspection service is given for cotton, but for many years the natives have been obliged to sort the cotton into two qualities—clean and dirty—and have fully appreciated the benefits which this has brought them.

MARKETING.

Although the Native Produce Marketing Ordinance was promulgated in 1935, it was not possible to introduce Rules during the year, so that no commencement was made with the system decided upon for the present, which is a system of confining the purchase and sale of particular products to certain centres, sufficient in number to make transport convenient for the native growers. The system is to be introduced throughout the Central Province in 1936 for wattle bark, maize, potatoes and beans, the same products which undergo inspection. The natives are anxious for its introduction, since the reserves are now traversed by large numbers of native traders seeking to make purchases at the growers' huts, resulting in very much lower prices for the produce than would be paid by means of active, open competition at appointed centres.

In the meantime, in the Central Province the Local Native Council godowns at a number of centres, with an appointed agent for purchasing exportable produce offered by the growers (in competition, of course, with local merchants), have

not proved satisfactory; as a system, as a means of improving the price to the producers or even as a good outlet for the disposal of crops such as maize and beans, both exported and consumed locally. For wattle bark, however, the godowns have been most useful in assisting the purchase and rapid evacuation of the product. A change to be made in 1936, the result of experience gained, will, it is believed, improve the position of the godowns as a contributing factor towards the organized marketing of native produce; the godowns will be retained as purchasing centres under the new system.

[The Reports of the Provincial Agricultural Officers, Nyanza, Central and Coast Provinces, will be found in a separate volume.]

GRADING AND INSPECTION SERVICES.

The following report on the Grading and Inspection Services has been prepared by Mr. C. L. Silvester, the Chief Grader and Inspector :—

PLANT IMPORT INSPECTION.

The following table shows the number of packages and the values of the various importations into the Colony of seeds, plants, fruit, etc., during the years 1933, 1934, and 1935 :—

	NO. OF PACKAGES			DECLARED VALUE		
	1933	1934	1935	1933	1934	1935
				<i>Sh. cts.</i>	<i>Sh. cts.</i>	<i>Sh. cts.</i>
Seeds ..	705	1,010	2,111	50,855 83	57,231 36	41,710 71
Fruit ..	12,913	23,906	20,597	105,344 51	203,464 11	197,385 14
Plants ..	184	223	678	6,853 22	9,720 53	7,957 44
Fruit Trees..	165	182	222	17,651 47	22,620 86	21,746 49
Tea Seed ..	—	43	554	—	2,553 00	91,684 00
Bulbs ..	205	280	192	5,827 39	7,435 10	5,096 94
	14,172	25,644	24,354	186,532 42	303,024 96	365,580 72

The number of packages imported shows a slight decline when compared with the previous year of 5.03 per cent. Values are considerably higher, due to the importation of tea seed.

On behalf of Uganda and Tanganyika Territory, 200 packages, valued at Sh. 14,216/95, and 9 packages, valued at Sh. 61, were passed respectively.

GRADING AND CONDITIONING SERVICES.

Maize Grading.

Kenya maize from the 1934-35 season's crop commenced to arrive at Mombasa on the 17th January, and continued practically without interruption until the 27th July. No further maize was submitted for grading until the 23rd November, when the first of the new season's crop arrived, grading being again continuous from that date until the end of the year.

(a) Maize Submitted Direct for Grading at the Coast.

A total of 588,104 bags of maize was submitted direct for grading at the Coast. The following table gives the grades, number of bags, and relative percentages to the total received, with a comparative table of percentages for the previous year :

GRADE	Number of Bags	Percentage of Total Received	Comparative Percentage for 1934
		<i>Per cent</i>	<i>Per cent</i>
K2	424,325	76.03	55.55
K2 SW	40,954	7.34	10.14
K3	57,161	10.24	21.74
K3 SW	11,438	2.05	3.46
K4	1	—	—
K7	191	0.03	—
K8 FW	2,959	0.53	0.9
K8 FW SW	1,602	0.28	0.31
Total Graded ..	538,631	96.51	92.1
Rejected :			
Wet	10,948	1.96	4.76
Musty	112	0.02	—
Weevily	7,437	1.33	2.02
Other Causes ..	976	0.17	1.01
Total Rejected ..	19,473	3.49	7.88
Total Received ..	558,104	100.0	100.0

The total received, viz. 558,104 bags, is an increase of 338,475 bags (154 per cent) over the previous year's total of 219,629 bags.

Attention is invited to the percentages columns in the table. The improvement in the quality of maize graded is self-evident. It is also of interest to note that by the end of May 473,698 bags of maize had been received, the percentage of K2 being 82.64 per cent and the percentage graded 97.38 per cent.

The following table gives the average moisture content of maize rejected as wet and the sending station :—

STATION	Number of Bags	Average Moisture Content
Kitale	1,701	14.1
Njoro	422	14.2
Hoey's Bridge	113	14.5
Nakuru	9	—
Wet by Rain	8,703	—

In addition to the wet maize mentioned above, 1,271 bags of wet maize were consigned direct to the Conditioning Plant, 778 bags of which were wet by rain in transit.

(b) *Maize Graded at the Conditioning Plant after Treatment.*

GRADE	Number of Bags	Percentage of Total
K2	12,224	<i>Per cent</i> 65.53
K3	6,414	34.38
K8 FW	16	.09
Total Graded ..	18,654	100.0

Included in the maize graded after treatment are 5,489 bags of slightly weevilly maize which were conditioned in December, and to this latter is due the high percentage of K3.

(c) *Maize Regraded.*

Regrading was confined to graded maize which had been removed from the transit sheds to private storage and was later re-submitted for grading prior to shipment.

GRADE	No. of Bags
K2	22
K2 SW	1,516
K3 SW	747
Total Graded.. ..	2,285
Rejected :	
Weevily	874
Total Rejected ..	874
Total Received ..	3,159

(d) Graded at Kitale.

An inland grading service was re-introduced at Kitale during December, and grading commenced on the 16th, being confined to maize from the 1935-36 season's crop :—

GRADE						Number of Bags	Percentage of Total Received
							<i>Per cent</i>
K2	..	..	..	..	..	17,706	82.96
K2 SW	..	..	..	..	..	1,119	5.24
K3	..	..	..	..	..	1,518	7.11
K3 SW	..	..	..	..	..	760	3.56
K8 FW	..	..	..	..	..	25	0.11
K8 FW SW	..	..	..	..	..	33	0.15
Total Graded						21,161	99.14
Rejected—							
Wet	..	..	..	..	..	144	0.67
Weevily	..	..	..	..	..	36	0.12
Other Causes	..	..	..	..	..	2	—
Total Rejected						182	0.89
TOTAL RECEIVED ..						21,343	100.0

A large proportion of this maize arrived at the Coast before the end of the year, and was re-inspected. No alterations to the grades were made.

The total number of bags graded, totals of tables (a), (b), (c), and (d), viz. 601,260 bags, is an increase of 158 per cent over the total of 232,917 bags graded in the previous year.

Shipments.

Forty-one export certificates in respect of 511,615 bags were issued, as shown in the following table :—

Number of Certificates	Number of Bags	Description
8	21,059	(K2) Second Grade.
10	401,353	(K2) Second Grade (shipped in bulk).
1	396	(K2 SW) Second Grade. Slightly weevily.
4	27,236	(K2) SW Second Grade. Slightly weevily. Shipped in bulk.
8	12,212	(K3) Third Grade.
7	43,560	(K3) Third Grade. Shipped in bulk.
1	432	(K3 SW) Third Grade. Slightly weevily.
2	5,367	(K3 SW) Third Grade. Slightly weevily. Shipped in bulk.

The bulk of the maize exported was carried to Canadian and/or American ports in six chartered bottoms.

Local Shipments (Rule 25).

78,357 bags of maize were shipped to ports north of Beira, south of Port Said and the coast of Arabia. The total is an increase of 68.32 per cent on the previous year's total of 46,552 bags.

Maize—General.

The percentage of maize classified as K2, viz. 76.03 per cent, is by far the highest recorded. The improvement in the quality of maize submitted for grading can be traced to two distinct causes :—

- (a) The careful attention given by growers to the preparation of their maize for export;
- (b) The reduction in the incidence of ear rots due to more favourable distribution of rainfall over the growing period.

Evidence is by no means lacking, however, that the incidence of ear rots in the 1935-36 season's crop is on the increase, and weevils show a corresponding increase.

The presence of soil, both inside and on the outside of bags, was far too prominent throughout the year.

Droughted maize was received from a few areas.

CONDITIONING PLANT, KILINDINI.

Maize.

18,708 bags of maize were treated at the Conditioning Plant, consisting of 13,219 bags wet and 5,489 bags slightly weevily. Of the above total, 1,271 bags were accepted as consigned direct to the Plant.

Beans.

6,782 bags of beans were treated for the destruction of bean beetle (*Bruchus* sp.).

Grading of Potatoes.

83,343 cwt. of potatoes were submitted for grading and classified as follows :—

GRADE	Number of Cwt.	Percentage of Total
		<i>Per cent</i>
K1	1,418	1.70
K2	79,326	95.18
Seed	1,550	1.86
Rejected ..	1,049	1.26

The total of 83,343 cwt. is an increase of 150.44 per cent over the previous year's total of 33,278 cwt., and is an increase on the previous highest total recorded in 1929 (67,503) of 23.47 per cent. The percentage rejected was very small, the causes for rejection being cut, diseased and undersized tubers. The standard of quality was reasonably high throughout the year, but there is one point which gives rise to serious comment, viz. the practice of mixing different types and varieties in the same bag, which has grown extensively during the year under review. Very little damage from potato moth was in evidence.

Practically all consignments intended for export to Mauritius were disinfected with Formol prior to shipment.

Shippers continue to complain of severe competition from Japan.

Ships' Storés.

Export entries in respect of 5,238 bags of potatoes, estimated at 8,381 cwt., were passed, an increase of 3,177 cwt. on the previous year's total.

Grading of Beans.

(a) Presented Direct for Grading.

The following table gives the quantities, varieties and grades of beans submitted direct for grading :—

VARIETY	K2	K2 SW	K3 SW	K4 SW	Total Graded	Total Received
Rose Coco ..	2,128	3,010	—	2	5,140	5,140
Canadian Wonder	—	671	—	—	671	671
Mixed	—	—	9	—	9	9
Total	2,128	3,681	9	2	5,820	5,820
Percentage ..	36.56	63.24	0.15	0.03	100.0	100.0

(b) Graded at the Conditioning Plant after Treatment.

VARIETY	K2	K3	K4	Total Graded	Total Received
Rose Coco	5,814	—	184	5,998	5,998
Canadian Wonder ..	1,321	—	—	1,321	1,321
Mixed	—	2	—	2	2
Total	7,135	2	184	7,321	7,321
Percentage ..	97.46	0.03	2.51	100.0	100.0

The total number of bags graded, viz. 13,141—totals of tables (a) and (b)—is an increase of 9,776 bags, or 290 per cent, over the previous year's total of 3,365 bags.

The quality of the beans submitted for grading was below normal, serious discoloration being present in nearly all consignments. There was also slight damage from anthracnose.

COOL STORES.

Comparative table of commodities stored during the last five years :—

COMMODITY	Unit	1935	1934	1933	1932	1931
Fruit	lb.	191,657	276,969	126,690	103,145	181,793
Fresh Fish ..	„	9,195	20,941	86,021	100,441	59,541
Cured Fish ..	„	48,427	40,839	41,407	36,560	48,549
Cheese . . .	„	10,328	11,422	9,595	9,752	18,325
Offal	„	4,577	3,991	2,749	2,760	3,130
Poultry .. .	Doz.	184 $\frac{5}{6}$	59 $\frac{1}{4}$	64 $\frac{2}{3}$	8 $\frac{2}{3}$	27 $\frac{1}{2}$
Butter .. .	Cases	8,278	3,783	1,803	5,213	5,098
Beef	lb.	45,285	49,519	35,250	35,040	43,620
Mutton & Pork	„	39,997	31,273	18,692	9,900	10,060
Eggs	Doz.	7,925	3,225	6,720	4,318	210
Ham and Bacon	lb.	500	756	905	871	4,170
Vegetables ..	„	2,787	2,949	4,525	634	312
Yeast	„	212	645	1,924	1,611	234

Note.

A number of miscellaneous items are stored each year which do not warrant inclusion in the comparative table.

The most significant increase in deposits was the quantity of butter stored. Fruit received a setback, whilst fresh fish continued its progressive decline.

Both machinery units were used alternatively throughout the year.

The electrical system was re-wired, and a new brine tank installed in No. 5 chamber.

DIVISION OF ANIMAL INDUSTRY

The following report on the work of the Division of Animal Industry has been presented by Mr. R. Daubney, Acting Deputy Director (Animal Industry).

Following the practice in recent years this report will be considerably condensed. It is compiled largely from the reports of District Veterinary Officers, and I am grateful to Major R. Scott Little, who has been mainly responsible for its compilation. The Report of the Chief Veterinary Research Officer and the Report on the operation of the Naivasha Experimental Station for the period from March to December, 1935, are presented in a separate volume.

It is a pleasure to acknowledge the assistance that has been rendered during the year by officers of the Administration, Police and other departments in the work of this Division, and I wish also to express my appreciation of the work of the staff, which has been ably carried on in spite of large reductions in personnel.

Captain O. Dixon, M.C., proceeded on leave on the 12th December, 1935, pending his retirement. His post will be retrenched in 1936. Messrs. Henderson, Harris and Nimmo, Stock Inspectors, were also retrenched during the year, and further retrenchments will take effect during 1936. The post of Animal Husbandry Officer vacated in 1934 by Mr. Jardine has remained unfilled during this year.

Since the change-over to mixed farming largely affects the areas of enzootic East Coast fever infection, it is here that closer control of the disease must be attempted; further to reduce the staff in these areas is merely to invite disaster and to risk the abandonment of the project on account of a factor that is well within our power to control.

There has been considerable improvement during the year in the prospects of the mixed farmer. In the second half of 1935 London butter prices rose, and the produce of this country benefited by the general rise. The milk-recording scheme was in operation under the ægis of the Royal Agricultural and Horticultural Society for the first time in 1935, but at the moment the cost of the scheme to the farmer is such that only pedigree pure-bred cows will be recorded. It is desirable that the scheme should, if possible, be modified to encourage the recording of grade cows, which, after all, form the basic stock of the cream-producers in this country.

The rise in the price of wool has placed the sheep farmer in a satisfactory position. During the latter part of the year a number of live cattle was exported to Italian Somaliland for slaughter. There is some prospect that a steady demand will

be maintained in this trade, and in consequence prices of slaughter stock have hardened on the Nairobi market, and the farmer is likely to receive a profitable price for his steers.

The Italian importers require veterinary certificates stating that the stock are free from infectious disease and are suitable for export. This has necessitated a considerable amount of travelling and inspection work by officers of this Department, and this service has been given free.

The movement in favour of control of the dairy industry resulted in the appointment of a Dairy Industry Inquiry Committee, whose work has been referred to elsewhere.

Another Committee, the Meat and Live Stock Inquiry Committee, was appointed to investigate the possibility of organizing a meat export trade, and to ascertain whether there was need for legislation to ensure cattle improvement along the lines adopted in other countries, where the scrub problem is a serious one. Two members of the staff of this Division are serving on that Committee. It is impossible to over-estimate the benefit that would accrue to the community if an organized meat export could be arranged. In addition to the export of beef from native and settled areas, fat lambs might be produced with advantage by the mixed farmer, who would gain in the returns from the sale of his lambs, and in the valuable effect of a flock of a few hundred ewes upon his general farming operations. The export of frozen porkers would enable the cream producer to utilize his surplus skim milk to the best possible advantage. It seems improbable that any other country in the world could be more favourably placed in respect of the provision of cheap foodstuffs for pig-feeding, but at the present time the local market and the neighbouring export markets are saturated, and a system of rationing the producer has had to be enforced by the bacon-curing factories.

During the year progress has been made in the shade-drying of hides. Large numbers of hide *bandas* have been built, and new areas have been brought under the regulation prescribing shade-drying. The quality of the hides continues steadily to improve, and it is noteworthy that the method practised in this Colony is now being adopted by other countries.

Numbers of native stock are now on the up-grade after the heavy losses of the recent drought years. Prices on the whole have been low, and there is some indication that the more conservative pastoral native might be prepared to accept ordinary economic standards of stock-raising if a drive were

made in the near future. It will be observed that the numbers of pedigree stock imported during the year are higher than in any recent years.

As judged by the consumption of laboratory products, 1935 was not a particularly bad year for diseases of live stock. The rainfall was still considerably below normal in most districts, and there were no serious outbreaks of epizootic disease. Further references to this subject are made under the appropriate headings.

IMPORTATION OF PURE-BRED STOCK INTO KENYA COLONY DURING 1935

					Bulls	Heifers	
CATTLE—							
Shorthorn	..	..	..	..	6	—	
Black Welsh	..	..	..	..	2	—	
Guernsey	..	..	..	..	2	4	
Jersey	..	..	..	..	3	2	
Ayrshire	..	..	..	..	3	2	
Red Poll	..	..	..	..	4	5	
Friesian	..	..	..	..	8	17	
					28	30	Total 58
					Rams	Ewes	
SHEEP—							
Romney Marsh	..	..	..	..	10	—	
Merino	..	..	..	..	55	—	
TOTAL					65	—	
Horses	..	..	..	..	2		
Pigs	..	..	..	..	8		
Dogs	..	..	..	..	74		
Poultry and other Birds	..	..	..	..	220		

STOCK MOVEMENTS.

Export.

Kenya to Uganda.—Export of cattle from Central Kavi-rondo to Uganda by Lake steamer ceased in February, 1935. This market is now considered to be non-existent. The progressive reduction of late years is shown below :—

Year.	Total.	Estimated Value.
1932 ...	2,950 cattle ...	Sh. 177,000
1933 ...	1,374 cattle ...	Sh. 82,440
1934 ...	257 cattle ...	Sh. 15,420
1935 ...	67 cattle ...	Sh. 4,020
	2,788 sheep and goats ...	Sh. 16,720
	60 pigs ...	Sh. 2,000

Lamu to Zanzibar.

	1934.	1935.
Cattle	407	875
Sheep and goats ...	2,301	3,936

Kenya to Italian Territory.—From the Nanyuki, Laikipia, Nakuru and Naivasha areas during 1935 :—

2,750 cattle,
697 donkeys.

To Tanganyika Territory.—580 head of cattle passed through Loitokitok en route for Tanganyika Territory.

Masai Reserve.

Slaughter cattle from the Masai Reserve :—

6,467 to Nairobi Abattoir.
2,049 to Kikuyu.

Sheep exported through Kijabe :—

Ex Narok, ... 17,758
Ex Ngong ... 2,112

Machakos Reserve.

Comparative figures of stock passed out of the Machakos Reserve are as follows :—

	1934.	1935.
Cattle	3,525	9,512
Sheep and goats ...	37,235	76,062

Kitui Reserve.

Stock movements from the Kitui Reserve during 1935 were :—

3,304 cattle,
7,143 sheep and goats.

Baringo Reserve.

Movements from the reserve were :—

29,269 sheep and goats,
668 cattle,
2,007 donkeys.

Nandi Reserve.

Stock movements from the reserve were :—

4,760 squatter cattle,
93 trade cattle,
40 European cattle,
2,542 sheep and goats.

Central Kavirondo Native Reserve.

The following are comparative figures for stock passed through Kibigori during the years 1934 and 1935 :—

	1934.	1935.
Bullocks	1,269	351
Heifers	5,477	926
Sheep and goats ...	8,532	1,301

South Kavirondo Native Reserve.

Slaughter cattle as follows were passed to Central Kavirondo :—

13,810 cattle,
1,312 sheep and goats.

North Kavirondo Native Reserve.

326 head of cattle passed out of the reserve during the year.

Lumbwa Native Reserve.

Approximately 8,000 head of slaughter cattle passed out of the reserve via Sondu.

Mariakani Centre.

The following stock from the various districts passed through this centre during the year :—

From the Tana River District :

859 cattle,
251 sheep and goats.

From the Kitui District :

1,299 cattle,
1,782 sheep and goats.

From the Kwale District :

1,915 cattle,
6,946 sheep and goats.

From the Kilifi District :

1,916 cattle,
6,947 sheep and goats.

Total passed through the Centre :

5,989 cattle,
15,926 sheep and goats.

Mombasa.

10,374 sheep and goats and 3,750 cattle arrived at Mombasa from the mainland for slaughter purposes.

STOCK SLAUGHTERED DURING THE YEAR 1935

SETTLED AREAS	SHEEP AND GOATS		CATTLE		PIGS
	Grade	Native	Grade	Native	
Nairobi	10,668	23,417	4,806	9,544	2,226
Mombasa	2,225	16,075	973	5,234	—
Nakuru	—	2,993	—	1,722	179
Eldoret	—	2,015	—	1,429	402
Kitale	—	833	—	1,163	214
Naivasha	—	347	—	325	8
Kakamega	—	927	—	1,837	88
Lumbwa	—	—	—	780	—
Kisumu	—	2,043	—	1,068	67
Total Settled Areas..	12,893	48,650	5,779	23,102	3,184
NATIVE RESERVES					
North Kavirondo (Approx.)	—	12,000	—	6,000	—
Samburu (Approx.) ..	—	—	—	10,000	—
Lumbwa Reserve (Approx.)	—	—	—	8,000	—
Masai Reserve	—	—	—	9,007	—
Machakos Reserve ..	—	218	—	490	—
Mariakani	—	362	—	237	—
Lamu	—	414	—	278	—
Total Native Reserves	—	12,994	—	34,012	—
TOTAL FOR THE COLONY	12,893	61,644	5,779	57,114	3,184

NOTE.—The above figures exclude Central Kavirondo and South Kavirondo.

SECTION I.—SETTLED AREAS.

Staff Distribution.

During the year the European staff was distributed as follows :—

DISTRICT					Veterinary Officer	Stock Inspector
Nairobi	..	..	..	..	—	1
Nakuru	..	..	..	..	1*	—
Naivasha	..	..	..	..	—	1
Eldoret	..	..	..	..	1	—
Kitale	..	..	..	..	—	1
Lumbwa	..	..	..	..	1	—
Kericho	..	..	..	..	—	1
Nanyuki	..	..	..	..	1	—
Thomson's Falls ..	..	..	..	..	—	1
TOTAL ..					4	5

*Part Time.

Disease—General.

The year under review gave little cause for satisfaction with regard to the incidence of animal diseases, except of rinderpest, which showed a substantial reduction in outbreaks as compared to 1934. Contagious bovine abortion also showed a reduction, but this was in all probability due to the non-reporting of cases.

There are indications, however, that the economic difficulties of the past few years are becoming less onerous, and it is to be hoped that stock farmers will soon be in a position to adopt in a much firmer manner the recognized methods of disease control. In the immediate past, many have been obliged to defer as long as possible the simplest steps to control disease and thereby have run considerable risk; nor, indeed, can they be unduly criticized for doing so. Their task has not been lightened in certain areas by the number of farms that are to all intents and purposes derelict.

It is reasonable to assume that as prosperity returns, and more farmers go in for good class stock, measures such as dipping and fencing will come to be regarded in their true light as insurances both for the individual farmer and for the stock industry of Kenya as a whole.

There still remain far too many outbreaks of disease which are to be attributed to the movement, usually illicit, of squatter-owned stock, but fortunately there is growing realization that it is not very good farming to allow a not inconsiderable area of a farm to be a grazing ground for stock which, with the best will in the world, it is almost impossible to control.

The idea that without stock it would be very difficult to obtain labour seems not so popular or so readily accepted as in former years, and indeed it is already evident that no serious consequences have followed in those areas where drastic reductions have been made in the squatter-owned stock population. Farmers' associations can be of great service in this matter, since the first consideration in any movement to reduce squatter-owned stock is to obtain unanimity among the farmers of the district. It is fortunate that most squatters are located in the plant-growing as opposed to the stock-owning areas. In all, however, there should be no difference of opinion as regards the undesirability and danger of retaining squatter sheep and goats on European-owned farms.

The following is a summary of outbreaks of disease in Settled Areas during the past five years :—

DISEASE	1931	1932	1933	1934	1935
Rinderpest	29	61	35	68	37
East Coast Fever	33	76	109	83	85
Pleuro-pneumonia	1	1	3	4	4
Blackquarter	104	54	56	58	56
Trypanosomiasis	10	8	12	3	2
Foot and Mouth Disease ..	20	21	20	26	7
Horse Sickness	19	11	12	14	27
Ulcerative Lymphangitis ..	3	9	5	15	6
Epizootic Lymphangitis ..	—	6	—	—	1
Contagious Bovine Abortion ..	29	16	13	19	8
Swine Fever	4	1	—	4	2
Anthrax	25	25	41	29	34
Rabies	1	23	22	11	41

Quarantines.

The following particulars are furnished in respect of quarantines imposed and revoked during the year, in Settled Areas and Native Reserves, showing comparison with 1934 :—

DISEASE	Imposed		Revoked		Remaining	
	1934	1935	1934	1935	1934	1935
East Coast Fever :						
Northern "Clean" Area	42	48	27	49	112	111
Molo "Clean" Area ..	12	5	3	8	18	15
Limuru "Clean" Area	1	4	—	—	3	7
Rinderpest	72	56	63	58	22	27
Trypanosomiasis	1	2	12	2	12	13
Rabies	15	3	14	7	8	5
Bovine Pleuro-pneumonia	8	4	5	2	12	16

Rinderpest.

There was a notable reduction in the number of outbreaks of rinderpest as compared with the number in 1934-35; against 68 of these, 18 were undoubtedly due to the illicit movement of squatter-owned stock, while in the remaining ones, infected or dead game was noticed in the neighbourhood immediately prior to the actual outbreak. Mortality was, in all cases except one, low owing no doubt to the prevalence of the disease in previous years, as a result of which most stockowners had immunized their cattle.

In some districts double-inoculation was used to control the disease, and this method, giving permanent immunity, was also employed in one or two areas where an annual inoculation is carried out.

Spleen virus continued to be issued from the Veterinary Laboratory, and as it is available at short notice, and is supplied in compact ice-chests, it greatly simplifies the organization of field inoculations.

In some other districts vaccine alone was employed, and appeared to give very satisfactory results. In the remaining districts the method used was that of vaccine-virus. Evidence continues to accumulate that this method confers a very satisfactory and durable immunity.

The Rinderpest Service continued to function throughout the year, partly in Settled Areas and partly in Native Reserves.

RINDERPEST IMMUNIZATIONS IN SETTLED AREAS

SETTLED AREAS	Double Inoculations		Serum Alone	V.B. Tests	Rinder-pest Vaccinations	Vaccine and Virus
	Adults	Calves				
Kibigori	3,467	1,831	—	14	—	—
Machakos	1,391	33	—	—	—	1,066
Nairobi	1,961	368	—	38	1,051	—
Nakuru	—	—	—	—	1,612	—
Laikipia	—	—	—	—	—	5,715
Kisumu—						
Londiani ..	3,651	1,413	—	24	—	916
Kibos—						
Kibigori ..	494	97	—	—	—	476
TOTAL	10,964	3,742	—	76	2,663	8,173

Total Double Inoculations 14,706

Total Immunizations 25,618

Rinderpest immunizations in Native Reserves are given in their appropriate place, the sum total for the whole Colony is, however, given here :—

Total Double Inoculations ... 86,387

Total Virulent Blood Tests ... 556

Total Vaccinations ... 56,068

Total Vaccine and Virus ... 24,941

Note.—The figures for rinderpest vaccinations show only animals vaccinated by the staff, and do not include vaccinations carried out by stockowners themselves.

East Coast Fever.

The number of outbreaks, 85, was again unnecessarily high, each "clean area" showing an increased number. A number of these outbreaks were not serious, an interesting point being that 15 of them consisted of one case only. Many were no doubt due to the movement of stock driven by stress of drought, etc., to look for better grazing, but the position is not made any better on that account.

The problem of tick eradication is not a difficult one as such, but in Kenya it is complicated by the apparent impossibility of controlling the movement of native-owned stock, the complete absence of properly defined stock routes, and the completely opposed points of view of those who believe in eradication and those who believe in allowing the young stock to become infected, with the idea of acquiring immunity. There is no doubt until adequate facilities are provided for much more extensive dipping and fencing it is hopeless to look forward to anything approaching eradication of this or any other tick-borne disease. It has not yet been found possible to bring into force the provisions of the Dipping and Fencing Ordinances.

Contagious Bovine Pleuro-pneumonia.

There were four outbreaks of this disease in the settled areas. All were dealt with by segregation and vaccination, and all were traceable to the movement of native stock. In some herds reactions to the shoulder vaccination were rather alarming, but the swellings subsided, and in most cases surgical treatment was not required.

Rabies.

Twelve cases of rabies were confirmed in the settled areas during the year, as compared with eleven in 1934. The methods of control that have proved of greatest value in previous years were again used: shooting of stray and ownerless dogs, and the distribution of pieces of meat poisoned with strychnine over the area in which a positive or suspicious case had been observed. In some cases a whole carcass was poisoned and a number of lines of meat were laid leading to it. This was often the most successful method.

The diagnosed cases came from the districts of the Uasin Gishu and Trans Nzoia, in which the number of animals found dead as a result of control measures were :—

	Dogs	Jackal	Hyæna	Others
UASIN GISHU				
795 baits. Mortality	6	207	43	—
Destroyed by other means ..	63	28	—	4
TRANS NZOIA				
6,253 baits. Mortality	308	157	33	21
Destroyed by other means ..	399	10	—	50
TOTAL ..	776	412	76	75

It is reasonable to assume that at least an equal number were poisoned but were never found.

It has not proved possible so far to make a forecast as to the probable direction of spread.

It is reported from the Trans Nzoia that an old native died showing symptoms of rabies following bites from a mad dog.

Further reference to this disease is made in connection with native areas, but the distribution of positive cases throughout the whole country is given below :—

	Dogs	Jackal	Total
SETTLED AREAS—			
Uasin Gishu	3	6	9
Trans Nzoia	—	3	3
NATIVE AREAS—			
North Kavirondo	4	1	5
TOTAL ..	7	10	17

Blackquarter.

Fifty-six outbreaks of blackquarter were recorded, with fairly high mortality, especially among squatter stock. Vaccination was practised in most of the outbreaks, and was very successful in checking the disease and preventing further mortality.

In those districts which are known to be infected routine annual vaccination of all susceptible stock is a cheap and most effective measure of control.

Anthrax.

Thirty-four outbreaks were reported, including one in which sheep alone were concerned. In most cases mortality was low, due to the prompt measures of vaccination taken by the owners. In a few cases, however, action was delayed, and a high death-rate ensued. On many farms where the disease is established and recognized, it is customary to carry out an annual vaccination of stock that are exposed to infection, and should the disease appear on farms where this practice is followed the loss is very slight.

Foot-and-mouth Disease.

Seven outbreaks only were noted, the lowest number for seven years. During the previous year there were 26 outbreaks. In all, the disease was very mild, and the lesions healed quickly. There was little tendency to extension, and control was readily established by the usual measures of segregation and restriction of movement.

Ulcerative and Epizootic Lymphangitis.

One outbreak of epizootic lymphangitis and six of ulcerative lymphangitis were all that were recorded during the year. This may be compared with the state of affairs a few years ago, when it was not uncommon to have figures of between 17 and 40. The two main reasons for this remarkable change are the growth of motor traffic and the fact that those people who keep horses keep animals of a much better quality and therefore are much more particular in caring for them.

Trypanosomiasis.

Two fresh outbreaks were investigated, each having one or two cases only.

The disease occurs only in a few isolated areas, all close to infected native territory, and there has so far been no tendency for it to spread. It would seem that infection is largely brought in from time to time, rather than that it is permanently present.

Contagious Abortion, Bovine.

Eight outbreaks were reported.

Swine Fever.

Two outbreaks were reported.

Other Diseases.

In addition to the diseases of animals noted above, the following were recorded during the year, but in no case were they widespread or the cause of much trouble.

Tick-borne diseases were the most noteworthy, and it is probable that if more advantage were taken of the existing facilities for diagnosis they would not cause the loss which they do at present through the disease not being dealt with in its early stages:—

Heartwater, redwater, anaplasmosis, canine tick fever, equine piroplasmiasis, horse sickness, "turning sickness", Nairobi sheep disease, Laikipia lung disease, blue tongue, colon bacillosis, bacillary necrosis, fowl typhoid, paratyphoid, hæmorrhagic septicæmia, malignant catarrh of cattle, swine influenza, streptothricosis, measles in pigs, vegetable poisoning, arsenic poisoning.

Comparative summaries of the disease position in the various veterinary districts during the year and the three previous years are given herewith:—

NAIROBI

DISEASE	1932	1933	1934	1935
Rinderpest	13	7	22	11
East Coast Fever	3	32	30	16
Epizootic Lymphangitis ..	6	—	—	—
Ulcerative Lymphangitis ..	4	1	11	1
Anthrax	3	5	4	7
Trypanosomiasis	4	5	2	1
Bovine Pleuro-pneumonia ..	—	1	—	1
Swine Fever	1	—	—	—
Horse Sickness	2	—	6	—
Blackquarter	3	1	—	5

NAKURU

DISEASE	1932	1933	1934	1935
Rinderpest	3	4	1	2
East Coast Fever	13	17	19	13
Trypanosomiasis	1	6	1	1
Blackquarter	2	11	6	8
Anthrax	8	20	6	14
Foot-and-Mouth Disease ..	4	8	4	—
Horse Sickness	1	2	3	9
Ulcerative Lymphangitis ..	5	—	1	—
Contagious Abortion	8	12	9	1
Kikuyu Fowl Disease	2	1	1	1
Swine Fever	1	—	1	1

UASIN GISHU AND TRANS NZOIA

DISEASE	1932	1933	1934	1935
Rinderpest	24	7	5	1
East Coast Fever	26	26	11	22
Anthrax	9	9	4	1
Blackquarter	42	38	45	37
Trypanosomiasis	1	—	—	—
Ulcerative Lymphangitis ..	—	1	—	2
Foot-and-Mouth Disease ..	7	2	4	—
Horse Sickness	1	—	1	—
Kikuyu Fowl Disease	11	3	1	1
Contagious Abortion	—	—	2	4
Bovine Pleuro-pneumonia ..	1	—	—	—
Cowpox	—	2	—	—
Rabies	—	7	9	12

NANYUKI

DISEASE	1932	1933	1934	1935
Rinderpest	—	—	17	17
East Coast Fever	16	30	14	29
Bovine Pleuro-pneumonia ..	—	1	2	—
Foot-and-Mouth Disease ..	—	7	14	1
Trypanosomiasis	2	—	—	—
Heartwater	2	4	4	3
Blackquarter	1	5	5	—
Horse Sickness	6	9	2	17
Anthrax	1	5	13	10

LUMBWA

DISEASE	1932	1933	1934	1935
Rinderpest	18	12	17	4
East Coast Fever	8	4	9	5
Anthrax	2	2	2	—
Blackquarter	—	—	2	3
Trypanosomiasis	—	2	—	—
Ulcerative Lymphangitis ..	—	3	1	1
Foot-and-Mouth Disease ..	2	—	4	—
Horse Sickness	—	1	2	—
Contagious Abortion	—	1	2	1
Bovine Pleuro-pneumonia ..	—	1	2	1
Hæmorrhagic Septicæmia ..	—	1	1	—
Rabies	1	13	2	—

MACHAKOS

DISEASE	1932	1933	1934	1935
Rinderpest	8	5	6	2
Bovine Pleuro-pneumonia ..	—	—	—	—
Anthrax	1	—	—	1
Blackquarter	1	—	—	2
Ulcerative Lymphangitis ..	—	—	2	—

RETURNS FROM THE GOVERNMENT DIPPING STATIONS FOR THE LAST FOUR YEARS

STATION	EQUINES				CATTLE				SHEEP AND GOATS			
	1932	1933	1934	1935	1932	1933	1934	1935	1932	1933	1934	1935
Nakuru ..	230	438	592	698	6,750	2,179	1,783	3,160	33,817	40,066	25,921	24,942
Isiolo ..	29	98	89	104	—	—	—	—	68,160	41,716	57,718	56,184
Nanyuki ..	—	—	—	—	29,836	25,260	18,489	571	—	—	—	—
Rumuruti ..	—	—	21	—	12,772	9,768	2,003	248	—	—	—	—
Thomson's Falls ..	—	—	—	—	—	—	1,614	3,254	122	—	—	—
Naivasha ..	—	—	—	—	13,433	18,390	19,814	22,557	15,278	13,453	21,133	16,401
TOTALS ..	259	536	702	802	62,791	55,597	43,703	29,790	117,377	95,235	104,772	97,527

Brands.

The number of stock brands supplied or otherwise dealt with during the year was as follows :—

European.

"S" Brands	...	...	...	7
Renewal Brands	...	...	...	8
Brands Registered	...	...	...	50
Brands Transferred	...	...	...	7
Brands Cancelled	...	...	...	—

Native.

Brands Registered	...	...	...	1
Brands Cancelled	...	...	...	—

Permit System.

During the year the following changes took place in the personnel of honorary permit issuers :—

Remaining, 31st December, 1934	...	...	...	136
New appointments	...	...	...	13
Resignations	...	...	...	8
Deceased	...	...	...	—
Remaining, 31st December, 1935	...	...	...	141

It is desired to take this opportunity of thanking all honorary permit issuers for their valuable assistance during the year.

Slaughter Stock.

The following figures are given of the stock slaughtered in certain townships during the year :—

				Cattle	Sheep and Goats	Pigs
Nairobi	..	..	..	—	—	—
Mombasa	..	..	..	—	—	—
Nakuru	..	..	..	—	—	—
Eldoret	..	..	..	—	—	—
Kitale	..	..	..	—	—	—
Kisumu	..	..	..	—	—	—
Kakamega	..	..	..	1,837	927	88
Machakos	..	..	..	490	218	—

SECTION II.—NATIVE AREAS.

Staff Distribution.

During the year the European staff was distributed as follows :—

DISTRICT	Veterinary Officer	Stock Inspector
Central Kavirondo	1	1 (Maseno)
North Kavirondo	1	1 (Sangalo)
South Kavirondo	—	1
Machakos	1	1 (Machakos)
Samburu Reserve	1	2
Baringo Reserve	—	1
Nandi Reserve	—	1
Masai District	1	1 (Ngong)
		1 (Kajiado)
		1 (Narok)
		from Aug.
Kibigori	—	1
Isiolo	—	1
TOTAL ..	5	13

The Coast Province is staffed by one Veterinary Inspector and three veterinary assistants.

Disease Control.

The diseases which demanded most attention from the veterinary staff working in native areas were rinderpest, pleuropneumonia, East Coast fever, and rabies.

Practically all native reserves are under quarantine restrictions for one or more of the first three diseases, with the unfortunate result that access to any outside market is seriously hindered.

In many cases considerable areas of a native reserve are free from a given infectious or contagious disease, but on account of the impossibility of controlling movement from the other areas, the whole has to be kept in quarantine.

Rinderpest.

Outbreaks were reported from practically all native reserves and, depending on circumstances, were treated by ordinary double inoculation, vaccination, or virus plus vaccine.

In many reserves extensive inoculations were carried out at the request of the natives themselves, in order that their cattle might be immune and therefore safe should rinderpest

appear in the district. It is still difficult, however, in some cases to get natives to bring forward all their cattle at one time, as, by their present custom of having only as many immunized as they can pay for, a number of those left undone develop the disease by contact and in many cases die. It is to be hoped that as prosperity returns to the country as a whole, stock-owning natives will be able to have all their cattle done. In the meantime, endeavour must be directed to control, with complete eradication as the ultimate object.

In some reserves, owing to the inability of the native owners to find the money for payment of the fees, recourse was had to field-prepared vaccine, with or without virus. These methods are of great value in dealing with the true pastoral tribes, who have some traditional sense of stock husbandry. A second injection is given if it is considered necessary. In many tribes, however, it is almost impossible to get the cattle brought back for further treatment. Where these methods of using field-prepared vaccine were used, the immunization was given free, the owners of the stock as a whole contributing sufficient cattle for the production of the necessary vaccine.

IMMUNIZATIONS AGAINST RINDERPEST IN NATIVE RESERVES

	Double Inoculations		Serum Alone	V.B. Tests	Vaccinations	Vaccine and Virus
	Adults	Calves				
Central Kavirondo .	3,580	5,281	—	—	—	—
North Kavirondo ..	12,027	13,067	—	50	—	—
South Kavirondo ..	1,088	371	—	73	—	—
Masai Reserve ..	—	—	—	—	4,616	—
Machakos Reserve..	1,132	172	—	—	4,049	82
Lumbwa Reserve ..	3,796	4,942	—	—	—	—
Nandi Reserve ..	7,768	1,209	—	200	—	—
Elgeyo and Marakwet.. .. .	7,548	2,352	—	52	—	—
	64,333					
Baringo Reserve ..	7,348	—	—	105	—	—
Samburu Reserve ..	—	—	—	—	44,740	16,686
TOTAL ..	71,681		—	480	53,405	16,768

Pleuro-pneumonia.

This disease was reported from the Masai Reserve, the Lumbwa Reserve, and the Samburu Reserve, and in all the method of control adopted was segregation combined with vaccination. Due to the efficiency of the steps taken the disease

was in all cases confined to the areas which were actually infected.

Vaccination as a preventive measure was extensively carried out in the Samburu Reserve, some 62,000 head being dealt with. It can now be recorded that all the cattle on the Leroghi Plateau have been vaccinated. It is hoped that, with a subsequent vaccination, a considerable reduction in the number of cases may be recorded, with in time the complete elimination of the disease in this area, which for a long time has been heavily infected.

About 53,000 head of cattle were vaccinated in the Masai Reserve, mostly as the result of outbreaks in the Kajiado district. They were extremely successful, and the only difficulty experienced was in attempting to restrain the natives at the time of actual vaccination, so anxious were they that their cattle should receive attention.

Several outbreaks occurred in the Lumbwa Reserve, and were all dealt with by vaccination, usually at the request of the natives themselves. Only in one location was any difficulty experienced, and that was easily overcome with the assistance of the Administration; 25,600 cattle were vaccinated.

In all cases, whether in order to deal with an outbreak or as a means of preventing infection, the vaccination is given free.

During the year the South Kavirondo Reserve was freed from quarantine restrictions, but cattle moving northwards are still inspected at the Ongongo Quarantine Station as a precaution against the introduction of the disease from Tanganyika.

East Coast Fever.

Although all native reserves, with the exception of the dry northern districts, are considered as enzootic areas for East Coast fever, there are undoubtedly parts of some of them in which the disease is absent or is present to a very slight degree. Beyond the fact that these isolated parts are dry and consequently afford but little cover for tick-life during most of the year, there seems at present no ascertainable cause for its absence. It is probable that in these areas tick life (and therefore infection with East Coast fever) is at a minimum and is present only in "pockets". Apart from these pockets, conditions are unfavourable to the vectoring tick species, and any introduced from outside do not succeed in establishing themselves. Until cattle are driven by drought to invade these pockets of infection in search of grazing, no cases of the disease occur. These

and similar problems are being studied by the Entomologist, and their solution will assist in the whole problem of the control of tick-borne diseases.

There are two stations at which cattle destined for movement out of enzootic areas, and which require the "T" brand denoting that they have been tested on their immunity to East Coast fever, may be dealt with : Machakos, which passed out 134 cattle during the year, and Kibigori, which handled 612.

The fee for testing was reduced from Sh. 10 to Sh. 5 during the year.

Rabies.

Positive cases were reported only from North Kavirondo, mostly in the goldmining areas to the immediate south and south-west of Kakamega. Methods of control were reduced to the use of poison baiting. Operations were rendered extremely difficult by reason of the dense human population in the area. One case occurred in Kakamega Township. It is to be recorded that no serious incident took place as regards human beings. Five positive cases were observed, and 60,100 baits were put down, with a known mortality of 1,914 dogs, 625 jackals, and 1,379 other carnivora. As mentioned in connection with this disease in settled areas, no doubt many animals died and were never found.

One or two suspicious cases were observed in Central Kavirondo, and poisoning was carried out in order to reduce the number of vermin and stray dogs. 7,253 dogs, 23 jackals, and 71 other carnivora were accounted for. The quarantine kennels at Maseno, established to allow of the movement of dogs from the quarantined area, were not so fully occupied as in the previous year. Twelve dogs were released during the year, and none remained on the premises at the end of the year.

No case of rabies, positive or suspicious, was reported from any other native reserve, and perhaps it is not too much to hope that the end of the present series of outbreaks in Kenya may be in sight.

Trypanosomiasis.

Central Kavirondo.—It is suspected that the area of infection along the shores of Lake Nyanza is spreading in the locations of Samia and North Ugenya. Positive cases have occurred, but so far no tsetse flies have been caught. An entomological survey which is being undertaken should give

some light on the true position, which, in view of the continuation of more or less suitable "fly" country along a belt north of the Nzoia River and towards Mumias, may prove to be serious.

A large number of cases of trypanosomiasis were treated by the administration of tartar emetic, and practically all were enabled to continue working in the infected areas. This method of dealing with the disease, although useful in certain conditions, is of little or no value as a measure of elimination, since the cattle are immediately and continually re-exposed to infection. The only measures which will have any permanent value are those leading to the elimination of the tsetse fly.

Coastal Regions.—Very large tracts in the coastal area are infested with tsetse fly, and the whole province is considered a trypanosomiasis-infected one. There are, however, isolated patches and belts in which infection has not been recorded. A number of infected animals on Mombasa Island were treated with antimosan or with tartar emetic with considerable success; but, as said before, such measures are only palliative.

Samburu Reserve.—Considerable loss is occasioned among cattle grazing near the Uaso River. The natives are compelled to bring their stock down to the river for water, more especially in the dry season, and so cannot escape infection. With the pressure of work on other more important diseases, it has not been possible to attempt any measures even of temporary value.

Baringo Reserve.—Belts of infection are known to exist along the course of the Kerio and other rivers.

Other Diseases.

Anthrax, blackquarter, foot-and-mouth disease and "turning sickness" were the other main diseases which received attention during the year. It is, however, most necessary that notice should be drawn to the serious position caused in the hide and skin industry by the prevalence of various skin diseases, especially mange. At present there is no known practical method of dealing with mange except by dipping.

No noteworthy outbreaks of disease among sheep and goats were reported, with the exception of an extensive one of parasitic gastro-enteritis among sheep in the Samburu Reserve. Mange is the chief widespread disease among the small animals under native conditions. In certain suitable places

sheep dips have been installed, more as a means of demonstration than with any idea of coping with the immense problem at issue. When funds are available to allow of the preliminary questions of water supplies and trained native staff being attended to, it is hoped to begin work on the whole question.

Development.

Development in the native reserves as regards animal husbandry is mainly a question at the moment of attention to the hides and skins and dairy industries, and the control of stock movement with a view of obtaining access to markets. In the case of the first two mentioned, the imagination of the native is captured by the cash result of his endeavours, and of those who are working on his behalf. Here no long delay elapses between his acceptance of a new idea and the tangible result. In earlier days the confidence of the native was gained by concentrating on control of disease, and the advantage so won has now been consolidated. Having shown that there is no need for his cattle to die in large numbers from disease; the next step was to show the owner how to get much more value out of them when alive than when dead. The dairy and hide industries are directed to this end.

Considering the short time during which the departmental effort has been made, a not inconsiderable degree of progress has been achieved.

The main objectives of the Veterinary Training Centre are the instruction of selected young natives in the basic principles of animal husbandry, and the demonstration within the reserves of sound practice in handling animals and animal products. An effort is made to familiarize the pupils with simple aspects of physiology, hygiene and the causation and control of disease.

The tendency must inevitably be in the direction of fewer animals but better ones, and therefore of greater value and, as a consequence, demanding more thought and attention. In arable areas this means sooner or later a demand for individual ownership of land. In certain areas signs are not wanting among the more thoughtful and advanced natives. The possession of better animals by the natives will entail a growing demand on the veterinary services in native reserves.

The undoubted tendency in native stock development outlined above demands that attention be paid to the subject of nutrition as modified by local conditions. Under the present customary native practice, animal nutrition becomes merely a

question of grazing the natural grass of the locality; if the pasture should fail or be naturally of an inferior nature, there is no remedy other than that of moving to another place, which in certain reserves is impossible, and the cattle are accordingly reduced to a condition of semi-starvation. There is a great field for investigation into better and more effective, yet inexpensive, ways of providing food for stock under native conditions. The problem is not quite the same as in that of European areas.

A certain amount of work has been done at the Veterinary Training Centres, and its extension is a matter of necessity. Funds should be provided to allow this work to be carried on more energetically and extensively.

In the purely pastoral reserves greater attention should be given to the provision of increased water supplies, since during the dry season the stock is invariably concentrated near permanent water, with the consequent destruction of the soil by erosion when the grass cover has been removed, and the spread of disease by contact. A number of outbreaks of disease during the year were traceable to the fact that healthy stock had either to go waterless or run this risk.

Education.

The five Veterinary Training Centres continued their work of experiment, demonstration and propaganda during the year, and some reference has already been made to their activities. Steady progress is being made with the breeding-up of native herds of cattle for milking qualities. Progress is necessarily slow, not only on account of the slow breeding rate of cattle, but also because of the small numbers available. An essential factor in breeding is drastic culling of animals of poor or indifferent milk-producing capacity, and the larger the number of stock available for experiment the more rapidly improvement will be attained.

Natives who visit the various centres are impressed by the appearance and production of the cows, and by the rate of growth of the young stock, in comparison with what they are accustomed to in their own reserves. All the centres are situated in native areas heavily infested with ticks, and it is at once noticed by visitors that the cattle are very free from ticks, and that very few die from disease of any kind.

The pupils, on the whole, are very interested in their work, and many of them become quite proficient in dairying. All pupils who complete their training are given a certificate

to the effect that they have attended the course, and an attempt is made to find them work or to put them in touch with people to whom their services might be of value.

It has been very difficult up to the present to obtain boys who have obtained their Primary School Certificate. Teams of selected pupils were sent to Nairobi to demonstrate their work and to take part in competitions held during the Agricultural Show in July.

An outline is given below of the position at each centre during the year :—

Maseno.

On account of the danger of perpetuating the infection, 51 cows which at one time or another during the past three years had given a positive reaction to the test for contagious abortion were culled from the herds and disposed of. At the end of the year there were 82 head of breeding stock; 57 calves, of which only 19 were heifer calves, were born, and the average birth weight was 38.4 lb., as compared with 36.8 lb. in 1934. Five good bulls were transferred from Ngong, and all the station bulls on hand at the time were castrated.

The average milk yield of all cows actually milked was : 1933, 5.97 lb.; 1934, 4.57 lb.; 1935, 5.50 lb.

Sheep.—There were 40 sheep at the beginning of the year. One ram was transferred to Sangalo, and 9 sheep died, while 59 lambs were born, leaving a total of 89 sheep at the end of 1935.

Crops.—Lucerne, maize and Napier grass were grown.

Pupils.—Twenty new pupils were admitted during the year, and the full complement of 40 was maintained.

Rainfall.—The rainfall during the past three years was : 1933, 46.01 inches; 1934, 50.98 inches; 1935, 58.88 inches.

Quarantine Kennels.—The kennels maintained at Maseno for the convenience of people who wish to take dogs out of the rabies quarantined area were in use during the year.

Machakos.

There were 102 breeding cows and three bulls at the end of the year. Seven cows of no great value were culled and replaced by young heifers from the Machakos Reserve. Ninety-six calves were born during the year, and another three were aborted. Average birth weights were 36.50 lb.

The average milk yield of all cows milked was : 1933, 4.66 lb. ; 1934, 5.08 lb. ; 1935, 4.47 lb.

Sheep.—A small flock of sheep is kept, the male progeny being given to the natives in exchange for female lambs. At the end of the year there were 5 rams, 100 ewes, and 100 lambs.

Crops.—Maize, Napier grass and sunflowers were grown, in addition to some 700 acres of grass kept specially for hay.

Pupils.—There were 38 pupils during the year, 29 coming from the Machakos Reserve and 9 from Kitui. Very few had reached the desired standard of education.

Rainfall.—The rainfall during the past three years was : 1933, 27.33 inches ; 1934, 21.11 inches ; 1935, 31.25 inches.

Baraton.

At the end of the year there were 7 bulls and 84 breeding stock. 54 calves were born during the year, 16 of which were killed for reasons of shortage of milk or because they were unwanted bull calves.

The average milk yield of all cows milked was : 1933, 6.0 lb. ; 1934, 6.4 lb. ; 1935, 7.0 lb.

Crops.—Maize, Napier grass and lucerne are grown to supply additional food for the stock.

Pupils.—Eleven new pupils were admitted during the year, while 15 completed the two years' course, and of these 9 were found employment.

Rainfall.—The rainfall during the past three years was : 1933, 43.82 inches ; 1934, 42.16 inches ; 1935, 51.29 inches.

Sangalo.

Fifty-five calves were born. No disease affecting calves was observed, but unfortunately six calves were killed by leopards. The only average of milk yield which is available is that of 1935 : 6.2 lb.

Crops.—Maize, groundnuts, lucerne, Napier grass and sugar cane are grown for feeding to the stock.

Trees.—A small tree *shamba* is maintained on behalf of the Local Native Council, and has a steady output of trees all the year.

Pupils.—There were 16 pupils at the end of the year, 10 of whom were completing their two years' course. All the pupils left the station in July because they considered that

not sufficient attention was given them to enable them to gain a purely literary education. They had no complaint as to the animal husbandry work which they had to do. They were all sent back after the matter had been discussed by the Local Native Council.

Rainfall.—The rainfall during the past three years was : 1933, 59.27 inches ; 1934, 60.20 inches ; 1935, 56.41 inches.

Ngong.

TABLE OF WEIGHTS AND DAILY INCREASE OF GRADE CALVES

No. of Calf	Weight at Birth	No. of Days	Weight	Increase	Average Increase Per Day
	<i>lb.</i>		<i>lb.</i>	<i>lb.</i>	<i>lb.</i>
4	50	183	224	174	0.95
144	60	184	250	190	1.03
570	50	184	150	200	1.08
50	50	183	231	181	0.98
733	50	173	246	196	1.13
281	50	169	200	150	0.88
150	48	175	189	141	0.80
20	50	157	218	168	1.07
TOTAL ..	408	1,408	1,708	1,400	7.92

Average birth weight 51 lb.

Average increase at 25 weeks 175 lb.

Daily rate of live weight increase at
six months 0.99 lb.

The concentrates mixture is made up in bulk in the following manner :—

200 lb. maize meal,

200 lb. cake (simsim),

100 lb. bran,

and is fed according to tables. All the calves were given free access to hay made on the farm, as well as the foregoing rations, and all animals showed a very satisfactory and thrifty appearance at the end of six months.

Grazing Experiment.—An experiment was started on the 23rd July with two groups of eight native cows, the object of which was to determine the value of Rhodes grass in milk production as compared with the natural pasture at Ngong.

The two groups were comparable as nearly as possible as regards date of calving, capability of milk production as far as can be ascertained by records, and health, quality and age.

Both groups were grazed on 3 acres of Rhodes grass as compared with 40 acres of natural pasture.

The milk from each cow was weighed and recorded daily, morning and evening, and a note was made of the comparative condition of the groups. During the first fortnight a slight falling off of the Rhodes grass group was noticeable, due probably to the new pasture and the limited ground allowed them for grazing, but after the first month little or no comparison could be made.

	Pasture Group	Rhodes Group
FIRST MONTH=30 DAYS :	<i>lb.</i>	<i>lb.</i>
Yield	1,624	1,685
Average Monthly Yield	203	210
Average Daily Yield	6.76	7
SECOND MONTH=30 DAYS :		
Yield	1,329	1,399
Average Monthly Yield	166	174
Average Daily Yield	5.53	5.80
THIRD MONTH=30 DAYS :		
Yield	962	1,008
Average Monthly Yield	120	126
Average Daily Yield	4	4.20
AVERAGE FOR ONE COW FOR THREE MONTHS (180 DAYS)	489.40	511.50

The three-acre plot of Rhodes grass has thus proved superior to 40 acres of natural Ngong pastures.

On analysis of the figures it is found that the cattle on the Rhodes grass gave more milk, to the extent of 22.1 lb. per cow, over the cattle on the natural grass.

Grazing.—With the exception of the month of September, when the rainfall was very slight, there has been a plentiful supply of grass and all animals kept in good condition.

Towards the end of the year 19 acres was ploughed for the planting of Rhodes grass, which germinated well and shows promise of an excellent crop. Hay-making was carried out during the year, and several tons were stored, which proved very useful as a food for calves and young bulls.

Visitors.—Many people visited the centre during the year, both European and native, and were shown the working activities of the farm.

Dairy Industry.

Steady progress is being made with the development of the ghee industry in native reserves, and consideration is now being given to methods of controlling the growing movement and of distributing and disposing of the finished article. The internal market for ghee is still far from being saturated, and large quantities have to be imported. With the return to general prosperity and the organization of an export trade, local prices will tend to rise. This should give the industry a much more prominent position in the trade of Kenya than it has held up to the present.

Ghee is generally to be preferred as a native product to butter or cream. Under present conditions of native cattle management, it is not possible to look for a high standard of production, nor can one be too scrupulous on questions of hygiene. Ghee, properly prepared, is sterile, and can very well be made successfully under native conditions. On the other hand, good cream cannot be produced in any suitable quantity nor can it be transported unless pasteurized, which is not practicable at present for reasons of cost.

In some reserves most of the field dairies are privately owned by natives, while in others the Local Native Council has a considerable interest. In some cases natives find all the money on their initiative, and erect and equip the dairies themselves; in others, and where a demand exists, dairies are built and fitted by the Local Native Council and are handed over to private owners, who repay the total cost by instalments spread over a period agreed upon beforehand. The native owners are in practically all cases either ex-pupils of a veterinary training centre or men who have been selected by the officer in charge of a centre.

Central Kavirondo.

113 field dairies were in operation during the year. The amount of ghee produced fell from 6,429 tins in 1934 to 5,960 tins in 1935. It is believed that this was mainly due to the increased demand for fresh milk in the mining areas and in Kisumu. Prices averaged Sh. 15/30 a tin of 36 lb., falling as low as Sh. 14, but rising to Sh. 17/50 in December. 5,547 lb. of cream were sold to the Lumbwa Co-operative Creamery.

South Kavirondo.

There are now 468 separators working in this reserve. It is reported that 20,893 tins of ghee were inspected for export through South Kavirondo lake ports.

North Kavirondo.

Nineteen field dairies were working during the year, of which fifteen were owned by the Local Native Council. All ghee from these dairies is brought into Sangalo, where it is cleaned before being sold on behalf of the Council. 1,533 tins were sold at an average price of Sh. 17/50, ranging from Sh. 16 in April to Sh. 18/60 in December. 22,200 lb. of cream were sold to Elgon Creamery. Several consignments of cream were sent to the Eldoret Co-operative Creamery as experiments, but after a while it was found that under existing conditions ghee was a better article of trade.

Coast Province.

238 tins of ghee were produced at the four field dairies in the Kilifi district, as compared with 46 in 1934; 514 tins were sold at Mariakani at an average price of Sh. 14, while 1,428 tins were exported via Lamu at a price of Sh. 11 a tin.

A beginning has been made with the industry in the Machakos, Lumbwa, Nandi, Masai, and Samburu Reserves; in the case of the latter, 200 tins were sold at a price of Sh. 15 per tin.

During the year, 20,320 tins of ghee were imported from Tanganyika via Kisumu.

The total amount of ghee imported was 8,446 cwt., valued at £17,940, as compared with 8,678 cwt., valued at £18,555, imported in 1934.

The total amount of ghee exported was 4,532 cwt., valued at £11,638, as compared with 3,071 cwt., valued at £8,472, exported in 1934.

Hides and Skins.

The value of exports from Kenya for the last four years was :—

1932	...	...	...	£117,124
1933	...	...	...	£159,324
1934	...	...	...	£195,863
1935	...	...	...	£179,387

The preparation of hides in the native reserves again received much attention from the veterinary staff, and continued progress was made in the provision of hide drying sheds, the supervision of the preparation of hides, and the demonstration of better methods.

The most serious obstacles to the production of really good hides are the presence of skin disease and the impossibility of supervising the actual flaying of the animal. The majority of the animals are not slaughtered at central markets, but in ones and twos all over the native reserves. The methods of flaying are often very primitive, and cutting or gouging of the skin is very common. Frequently a delay of forty-eight hours occurs before the hide is taken to the nearest hide drying shed, and as a result "hair slip" is quite common, especially in wet weather. Unless the hide can be dealt with at the time the animal is slaughtered, subsequent work is only an attempt to make the best of damaged material. On the whole, however, there is a great difference between the hides now and those of a few years ago.

Attention has also been devoted to the improvement of skins, but owing to staff shortage, and the relatively much greater value of hides, progress has been slow.

Nyanza Province.

Steady progress is being made in the hide and skin industry, and the quality of the product is improving. All hides which pass through a recognized hide drying shed have a numbered label placed on them, to enable the buying firms to notify the veterinary staff of the particular reserve which is the source of hides dressed in an inferior manner. Very few adverse reports were received during the year.

In Central Kavirondo 14 new permanent drying sheds were erected, in addition to five temporary grass-roofed ones. Three of the older permanent ones were extended.

In North Kavirondo 12 new temporary and three new permanent ones were built.

In South Kavirondo 29 new temporary ones were put up, bringing the total up to 84, which is considered enough for this reserve.

Export figures are below below from one hide-buying firm from which figures are available, and would indicate a considerable drop in the number of animals slaughtered in the

three Kavirondo reserves. The main factors concerned were probably very good crops and a much lower death-rate from disease :—

	<i>Shade-dried.</i>		<i>Sun-dried.</i>	
	<i>Frasilas.</i>		<i>Frasilas.</i>	
Central Kavirondo	...	14,718	...	1,354
South Kavirondo	...	4,760	...	450
North Kavirondo	...	11,076	...	2,182

Export figures of sheep and goat skins are given by one firm as 137,396 for the year.

Forty-six tons of goat skins were imported from Tanganyika via Kisumu.

Masai Reserve.

A stock inspector was posted to the Narok district to assist in the development of the hide industry there, and during the year forty-one hide *bandas* were built.

In the Kajiado district, as practically no funds were available for hide *bandas*, recourse was had to the method of drying hides on movable frames in the open air. These frames are shifted during the day, so that the sun's rays never strike directly on to the flat surface of the hide, but only on its edge. It is a valuable method in areas where distance or the small numbers of stock preclude proper methods of shade-drying.

Machakos.

Three new permanent *bandas* were built, bringing the total up to 23. 4,500 shade-dried hides were sold, in addition to 8,900 sheep and goat skins.

It is very interesting to note that at a meeting of the Local Native Council a resolution was passed condemning the branding of cattle on the grounds that the hides were thereby rendered of less value.

Lumbwa Reserve.

A decided fall in the export of hides took place, which may have been due to the very good prices paid for cattle at the Sondu market and destined for the Kavirondo market. Only one hide *banda* is in use at present. 780 hides were exported.

Samburu Reserve.

Owing to the demands made on the staff by work in connection with disease control, it was not possible to devote

much attention to the hide and skin industry. Two temporary *bandas* were built. It is reported that about 8,000 sun-dried hides are exported from the reserve every year.

Baringo Reserve.

Five temporary *bandas* were erected, but there is at present no tendency on the part of the natives to use them. 902 *frasilas* of sun-dried and 64 *frasilas* of shade-dried hides were exported, together with 874 score of sheep and goat skins.

Nandi Reserve and Coast Province.

A beginning has been made in these districts, but no information is at present available as regards details.

Poultry.

Poultry are kept at the Veterinary Training Centres at Maseno, Machakos, Baraton and Mariakani.

In the Machakos Reserve, small breeding pens are maintained at a number of the village schools, the original birds being supplied from the Machakos Centre. The issue of birds and of eggs for setting was very satisfactory, and it is proposed to extend the system during 1936.

283 young birds and 194 settings of eggs were distributed from the Maseno Centre. Unfortunately, work was seriously held up by an outbreak of fowl pox.

In all cases the money is found by the Local Native Council concerned.

In the Nandi Reserve also a point is made of supplying district schools with pens of breeding birds. These out-schools thus form subsidiary breeding centres, and the teachers in charge supply settings of eggs to the more progressive pupils.

It is obvious that a long time must pass before any great improvement is noticed, but already the effects of good blood are to be seen in the immediate neighbourhood of the veterinary centre.

Native Markets and the Slaughtering of Stock.

Reliable information as regards the slaughtering of stock in native reserves is as yet impossible to obtain, except to a very slight extent at those market places where constant supervision is provided. In the three Kavirondo Reserves the consumption of meat is very high, and is steadily increasing. It is probable that the consumption of meat is increasing in nearly all reserves.

In certain districts, where there is a fairly high concentration of population, progress is being made in the provision of general marketing centres. This will allow of proper supervision of the slaughtering of stock, and the hides can be taken off properly and the meat inspected.

Movement of Stock.

During the year the two most notable features as regards movement of stock were (i) the cessation of trade in cattle to Uganda, which fell from 2,950 in 1932 to 67 in 1935, and has now ceased altogether; and (ii) the export of 1,750 cattle, 9,760 sheep and goats, and 113 donkeys to Italian Somaliland.

A very considerable movement of stock takes place to and from native reserves, especially to adjacent reserves, which is uncontrolled and cannot be stopped. Most of this movement is between areas which are very close one to another and not between places far removed. The possibility of disease extension is thus much reduced. The great danger is the spread of disease into European areas. This danger can be minimized to some extent by farmers taking steps to control their squatter stock.

Northern Frontier Province.

This Province still continues to be the chief exporting area of sheep and goats, although during 1935 export figures were eclipsed by those of Machakos.

Most of the trade is via Isiolo, and goes to the markets in the Kikuyu Reserve. The trade through Lamu is mainly to supply the Zanzibar market. At both Isiolo and Makowe, which is the quarantine post for Lamu for all stock from the eastern parts of the Northern Frontier, all stock is detained for observation and, if necessary, treatment. Export figures for sheep and goats for four years are:—

				<i>Isiolo.</i>		<i>Lamu.</i>
1932	...	...	...	68,160	...	6,104
1933	...	...	...	41,716	...	3,088
1934	...	...	...	57,718	...	4,600
1935	...	...	...	56,184	...	5,233

Masai Reserve.

During the year 8,516 cattle were moved out of the reserve on permit, 6,467 going to Nairobi via Ngong, and 2,049 going to Kikuyu, all for slaughter. A point of considerable interest may be noted here: At the Nairobi Abattoir all meat is

strictly inspected, and yet no case of pleuro-pneumonia was found in any of the cattle from the Masai Reserve. Sheep and goats form a very important export from this reserve; most of them go to the Kikuyu Reserve via Kijabe. There was a very marked drop during 1935, as is shown by the figures given below :—

				<i>Kikuyu.</i>	<i>Ngong.</i>
1934	...	...	...	35,000	2,188
1935	...	...	...	17,758	2,112

Machakos and Kitui Reserve.

12,816 cattle were moved out of these reserves on permits during the year. Although it is probable that drought and the failure of the crops were the chief causes of the remarkable increase in numbers, the export of sheep and goats must be a record for this area—83,205, as compared with 37,235 during 1934.

Nyanza Province.

Movement out of the North Kavirondo Reserve was again very small compared to the inward movement. During the year 6,250 cattle and 421 sheep and goats were moved into the reserve, all from the settled areas to the east, while only 326 cattle were moved outwards. Central Kavirondo exported 1,277 cattle only, as against 21,000 head imported. Many were brought in from South Kavirondo, and even from Tanganyika. All this stock was required for slaughter in addition to the local supplies. The demand for meat in this reserve is growing, and there are indications that a similar state of affairs will soon be found in the other two Kavirondo Reserves. The problem of overstocking does not exist in the Nyanza Province.

Rift Valley Province.

Some 5,000 cattle and 2,500 sheep and goats left the Nandi Reserve on permits, practically all the property of squatters on the European farms of the Uasin Gishu and adjoining districts. A complete census of stock has been begun in this reserve, but no figures are as yet available. About 8,000 Masai cattle and a large number of sheep and goats, together with over 4,000 Ndorobo cattle, were moved into the Samburu Reserve after being immunized against rinderpest and pleuro-pneumonia. 668 cattle and 29,000 sheep and goats were export from the Baringo Reserve.

Lumbwa Reserve.

8,000 cattle are recorded as having been exported from this reserve to the Sondu market in Central Kavirondo.

Castrations.

In certain reserves considerable progress is being made towards acceptance of the practice of general castration. The method used is that of the "Burdizzo" pincers, and it is attractive to the native because it does no harm to the animal, and does not cause an open wound which may, and often does, become infected. As opportunity arises this service will be increased and extended to other native reserves.

The results from certain reserves are given :—

				1934		1935	
				Bulls	Sheep and Goats	Bulls	Sheep and Goats
North Kavirondo	..	..		—	—	682	—
Central Kavirondo	..	..		2,200	—	3,153	607
South Kavirondo	..	..		160	—	692	—
Machakos	..	..	..	—	—	2,560	1,361

Much of the work would have been impossible were it not for the financial assistance that has been freely given by Local Native Councils from their own funds. This fact is in itself an indication that a very large measure of recognition has already been gained in the reserves.

Part III.—Financial

Statements of expenditure and revenue for the fiscal year under review are given below :—

EXPENDITURE	Amount Originally Sanctioned	Amount Expended
	£	£
"A" Administrative and General (including Total Cost of Headquarters Staff)	10,253	9,840
Grant to Agricultural Society	150	150
Contribution to Imperial Bureaux of Entomology and Mycology	450	450
Contribution to Amani Institute	2,028	2,028
Grant to Imperial College of Tropical Agriculture, Trinidad	250	250
Contribution to Colonial Agricultural Services	140	140
Contribution to Imperial Agricultural Bureaux	525	525
Fees and Expenses of Officers attending Courses of Instruction, etc.	35	16
Expenses of Board of Agriculture	500	545
Grant-in-Aid to Sisal Industry	1,000	1,000
Contribution to E.A. Agricultural Journal	—	306
Contribution to Locust Research	608	560
Locust Campaign	—	125
Statistical Machine	20	34
Rabies Campaign	—	54
"B" Division of Plant Industry	10,979	11,168
Subdivisions—		
Native Agriculture	18,117	17,679
Scott Agricultural Laboratories	10,005	9,946
Plant Breeding Services	3,135	3,053
Grading, Conditioning, etc.	5,622	4,657
"C" Division of Animal Industry	20,635	20,100
Subdivisions—		
Veterinary Research	22,869	23,438
Animal Husbandry	30	91
Native Services	19,148	18,949
	£ 126,499	125,104

REVENUE	Original Estimates	Actual Receipts
	£	£
Grading, Conditioning and Cold Storage Fees, etc.	5,500	4,068
Fees from Agricultural Chemical Laboratory	75	77
Sale of Farm Produce and Stock	800	788
Sale of Stores	50	124
Veterinary Inoculation Fees, etc.	8,000	9,756
Sale of Sera, Vaccines and Laboratory Products	3,000	2,836
	£ 17,425	17,649

Part IV.—Agricultural Legislation

The following legislation affecting agricultural industries was enacted during the year :—

ORDINANCES.

Agricultural Advances (Amendment) Ordinance, 1935.

Coir Fibre Industry Ordinance, 1935.

Marketing of Native Produce Ordinance, 1935.

Sale of Pyrethrum Ordinance, 1935.

Suppression of Noxious Weeds Ordinance, 1935.

RULES AND ORDERS.

Under the Agricultural Produce Export Ordinance (Cap. 98 of the Revised Edition):—

Grading of Maize (Amendment) Rules, 1935.

Under the Crop Production and Live Stock Ordinance, 1926:—

Wattle Bark (Marketing) (Amendment) Rules, 1935.

Native Produce Inspection Rules, 1935.

Native Produce Inspection (Amendment) Rules, 1935.

Under the Diseases of Animals Ordinance (Cap. 157 of the Revised Edition):—

Diseases of Animals (Poultry) (Amendment) Rules, 1935.

Diseases of Animals (Amendment) Rules, 1935.

Diseases of Animals (Amendment No. 2) Rules, 1935.

Diseases of Animals (Poultry) (Amendment No. 2) Rules, 1935.

Under the Diseases of Plants Prevention Ordinance (Cap. 155 of the Revised Edition):—

Diseases of Plants Prevention (Coffee) Rules, 1935.

Diseases of Plants Prevention (Coffee) (Amendment) Rules, 1935.

Diseases of Plants Prevention (European Corn-borer) Rules, 1935.

Under the Fencing Ordinance, 1929:—

Fencing (Minimum Standard Type of Boundary Fence for Cattle) Rules, 1935.

Under the Kenya Cotton Ordinance (Cap. 154 of the Revised Edition):—

Kenya Cotton (Amendment) Rules, 1935.

Under the Sale of Pyrethrum Ordinance, 1935:—

Appointment of the Kenya Farmers' Association as Agency.

Under the Sale of Wheat Ordinance, 1930:—

Sale of Wheat (Agency) (Amendment) Rules, 1935.

Under the Stock and Produce Theft (Levy of Fines) Ordinance, 1933:—

Application of Sections 10 and 11 to Elgeyo-Marakwet Native Reserve.

Under the Sugar Ordinance (Cap. 134 of the Revised Edition):—

Application of Sections 4 and 5.

PUBLICATIONS.

DIVISION OF PLANT INDUSTRY.

Bulletins.

No. 1 of 1935.—“Soil Erosion” by V. A. Beckley, Senior Agricultural Chemist.

No. 2 of 1935.—“Diseases of Cereal Crops in Kenya” by C. A. Thorold, Mycologist.

East African Agricultural Journal.

Vol. 1., No. 1.—“The Inoculation of Leguminous Crops” by J. McDonald, Senior Mycologist.

“The Cultivation of Lucerne” by R. S. Ball, Agricultural Officer.

“Vegetative Propagation of Coffee” by S. Gillett, Agricultural Officer.

Vol. 1., No. 2.—“Coffee Shade in Kenya” by T. L. McClelland, Plant Inspector.

“Coffee Fermentation” by T. L. McClelland, Plant Inspector.

“Leaf-Eating Caterpillar of Coffee” by F. B. Notley, Entomologist.

“Linseed: A Useful Cash Crop” by R. S. Ball, Agricultural Officer.

Vol. 1., No. 3.—“Agricultural Statistics in Kenya” by V. Liver-
sage, Agricultural Economist.

“Progress Report on Elgon Dieback of Coffee” by C. A. Thorold, Entomologist.

“A Further Note on Rhodes Grass” by D. C. Edwards, Agricultural Officer in Charge Grassland Improvement.

General.

“Progress Report on Coffee Berry Disease” by J. McDonald, Senior Mycologist (*Monthly Bulletin of the Coffee Board of Kenya*, Vol. 1, No. 11).

“Grasslands of Kenya. Areas of High Moisture and Low Temperature” by D. C. Edwards, Agricultural Officer in Charge Grassland Improvement (*Empire Journal of Experimental Agriculture*, Vol. III, No. 10).

“The Control of Insects by Hand-Picking” by R. H. Le Pelley, Entomologist (*Bulletin of Entomological Research*, Vol. 26, Pt. 4).

“The Common Coffee Mealy-bug of Kenya” by R. H. Le Pelley, Entomologist (*Stylops* 1935).

“Temperature and Humidity Relations of the Cockroach” by F. B. Notley, Entomologist (*Journal of Experimental Biology*, Vol. XIII, No. 1).

DIVISION OF ANIMAL INDUSTRY.

“Contagious Bovine Pleuro-pneumonia: Note on Experimental Reproduction and Infection by Contact” by R. Daubney (*The Journal of Comparative Pathology and Therapeutics*, Vol. XLVIII, Part 2, June, 1935).

“Studies on Reproduction in Cattle. I. The Periodicity and Duration of Oestrus” by J. Anderson (*Empire Journal of Experimental Agriculture*, in the press).

“Improvement of Native Cattle by Selective Breeding and Herd Management” by J. Anderson (*East African Agricultural Journal*).

STAFF LIST

AS AT 31ST DECEMBER, 1935.

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Assistant Chief Veterinary Research Officer.—Vacant.

Veterinary Research Officers.—J. R. Hudson, B.Sc., M.R.C.V.S., W. B. C. Danks, B.Sc., M.R.C.V.S., W. Fotheringham, M.R.C.V.S.

Entomologist.—A. E. Lewis, M.Sc., Ph.D.

Laboratory Superintendent.—A. J. Kemp.

Laboratory Assistants.—J. T. Schultz, H. J. Gray, J. R. McQueen, J. Forsyth, E. J. Hall, W. P. Bruce, F. Lyons, S. R. Pelling.

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Clerk-Librarian.—Miss D. Gent-Wood.

Mechanic.—O. Stenmark.

Storekeeper.—G. W. Clochley.

Laboratory Students.—D. N. Lewis, D. H. McCalman, T. K. Hill.

Principal changes and new appointments in technical staff during 1935:—

DIVISION OF PLANT INDUSTRY.

Mr. G. J. L. Burton, Senior Plant Breeder and Experimentalist, was acting Deputy Director (Plant Industry) from 5th March, 1935, to 25th September, 1935.

Mr. F. B. L. Butler, Grader and Inspector, proceeded to Cyprus on transfer on 12th January, 1935.

Mr. C. R. Nightingale, Temporary Cotton Officer, appointed Assistant Agricultural Officer, 1st January, 1935.

Mr. L. C. Edwards appointed Assistant Agricultural Officer, 24th February, 1935.

Mr. A. J. Cooper, Plant Inspector, resigned 15th May, 1935. Mr. C. Fielding Fox appointed Plant Inspector, 15th July, 1935.

DIVISION OF ANIMAL INDUSTRY.

Mr. O. Dixon, Senior Veterinary Officer, proceeded on leave pending retirement on 21st December, 1935.

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